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For the Study and Conservation of Birds

SPRING 1994

SWAINSON'S HAWK NEST BY TIM GALLAGHER

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For the Study and Conservation of Birds

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LIVING BIRD

SPRING 1994 VOLUME 13 NUMBER 2

Greetings from Sapsucker Woods

I wonder what people driving past thought we were doing. Standing at the edge of an open field with a dozen scopes lined up in front of us, we must have been an odd sight. Perhaps passersby thought we were a firing squad, or maybe some strange paramilitary group in training. Chilled by an icy drizzle, the six of us stood there pointing our high-power optics at the same feathered lump at the top of a utility pole.

What were we watching? A rare vagrant from a faroff land? Wrong. The bird that had us all transfixed was nothing more than a common European Starling. You see, we were working on the latest Lab of Ornithology equipment review—this time comparing spotting scopes—and were desperate for a bird of any kind to look at. The starling turned out to be a perfect subject. It takes a great scope to bring out the subtle feather detail of a dark-colored bird on a gloomy day . . . especially when you're shivering.

We spent many more days trying out the scopes. Sometimes we even got to use them on some really interesting birds, such as the Northern Goshawk that came barreling past above us as we stood in front of the Lab pond watching ducks. We swung our scopes up in unison and got a great look at the bird: a beautiful adult female. You'll find the results of our scope review on page 26 of this issue.

On another subject, we are pleased to welcome a new contributing editor to *Living Bird*. Mel White will now write our "Flying Field" column, which appears twice a year in these pages. A native of Arkansas, Mel is a full-time freelance writer who caught the birding bug as a child from his mother. You may remember the essays he wrote on the California Condor and the Golden-cheeked Warbler, or his feature on the ecological restoration of the Cache River. Many of you sent letters praising Mel's writing. We're glad to have him aboard.

— Tim Gallagher
Editor-in-Chief

Cover: A Trumpeter Swan sits on its nest near Yellowstone National Park. For more than half a century, a feeding program in a valley west of the park has provided food for the birds in winter. Now hundreds of them have lost the will to migrate. To read more about the swans' plight, turn to page 20. Photograph by Jeff Foott.

Right: The Joe DiMaggio of the bird world, a Great Blue Heron cruises over Fenway Park. For more on birds and baseball, turn to page 16. Illustration by Jack Unruh.

Back Cover: Harbingers of warm weather, Tree Swallows are a welcome sight after a long, cold winter. Photograph by David Welling.

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Letters

KIM BACON

BIRDHOUSE A WINNER

My son Bill (seven years old) made a Downy Woodpecker birdhouse using the plans provided in *Living Bird* ("A Basic Box for a Basic Need," Spring 1992). He was able to complete the entire birdhouse himself (with Dad helping to read the directions), using a handsaw, drill, sander, and screwdriver.

Bill entered his birdhouse in the California State Fair "Build a Birdhouse" competition sponsored by Chevron and the National Audubon Society. He won first prize in his division (nine years old and under).

Needless to say he was quite excited (as were his mom and dad). The judges praised his birdhouse for having the correct size hole, ventilation, easy access for cleaning, and lack of tree-damaging fasteners.

After the fair ended in September we put the birdhouse up in our backyard. We are looking forward to hosting some woodpeckers soon.

Kim Bacon
Sacramento, California

MORE SHELL-DROP SPECULATIONS

I lived on a rocky beach on Puget Sound from 1982 to 1986 and enjoyed watching the gulls dropping clams to break the shells. What fascinated me was that the crows did it, too.

Somehow it was more exciting to me that crows dropped shells than that gulls did, because I thought the crows had to have learned it by observing the gulls, whereas I had the idea that the gulls were doing it instinctively.

Katharine Thayer
Tillamook, Oregon

NEVER SAY NEVER

In "Murder Most Fowl" (Autumn 1993), John Alcock states that Brown Boobies "absolutely never rear two offspring to the age of fledging. At least one of the chicks always dies."

From May 1991 to July 1993 I was the wildlife biologist for the Johnston Atoll National Wildlife Refuge, southwest of Honolulu, Hawaii. Several hundred Brown Booby pairs nest there every year, and once in a while—perhaps twice each season—I saw a pair with two very large, healthy offspring. It is rare, but it does occur.

Donna O'Daniel
Payson, Arizona

YOU MADE ME WHAT I AM TODAY

Living Bird is my favorite birding publication. It probably contributed most to my transformation from backyard bird enthusiast to avid twitching maniac. It may have been the first letter from the Lab asking for pledges for the World Series of Birding. I pledged five cents a bird. The follow-up letter describing the antics of the team was worth far more.

I remember thinking how great it would be to join a Big Day team someday. To be able to identify birds by ear. To be considered a "good" birder.

The dream came true in 1991. I was asked to join an established team. We tied for 7th place. In 1992 I helped put together what was probably the first all-women's team. We came in 12th.

I've been meaning to write a thank-you note for years.

Ellen S. Short
Rockland, Delaware

We welcome letters from readers.
Address letters to: The Editors,
Living Bird, 159 Sapsucker Woods
Road, Ithaca, New York 14850.

BirdNews

COWBIRDS UNDER SCRUTINY

The Nature Conservancy and the U.S. Department of Defense (DOD) made an unlikely but effective team when they cosponsored a recent workshop on cowbird management. More than 150 ornithologists and resource managers discussed the latest research on this destructive nest parasite at the North American Workshop on the Ecology and Management of Cowbirds in Austin, Texas, last November.

"Up till now, the connection between forest fragmentation and increased cowbird parasitism was kind of a truism in the scientific community, but the data were shaky," says Scott Robinson, a biologist with the Illinois Natural History Survey and one of the workshop's program chairs. "Research presented at this meeting has solidified that connection."

By fragmentation, Robinson means the cutting up of continuous forests with roads and housing developments. Brown-headed Cowbirds lay their eggs in other birds' nests; they prefer open habitat, but roads let them penetrate to the heart of the forest, where many migratory songbirds nest.

Why is the DOD interested in cowbird management? Many military bases include large tracts of undeveloped land that have become significant wildlife habitats. The DOD is taking its stewardship seriously.

SEXUAL SEGREGATION

During the winter, Dark-eyed Junco populations in cold climates have many more males than females; in warmer areas, females outnumber males. Rebecca Holbertson of the State University of New York at Albany thinks a behavioral difference causes this curious segregation.

In laboratory studies described in *The Condor* (vol. 95: 580-87; 1993), she found that females seem to start migrating earlier than males—an average of 12 days earlier—and keep migrating after males have stopped. In other words, females travel longer, so they end up farther south.

How did Holbertson measure migration in the lab? Birds that are ready to migrate tend to hop around during the night. She placed juncos in cages with electronic perches that automatically kept track of the nocturnal bouncing.

Other explanations for junco sex segregation have included evidence that males are larger than females and can better withstand cold temperatures; that males are more aggressive than females and may push them out of winter territories; and that north-wintering males may be positioning themselves for an early return to the spring breeding grounds.

Holbertson says that any one of these situations might have exerted selective pressure leading to the gender difference in migratory behavior. Now, she says, this difference is by itself sufficient to keep the sexes separate in winter.

NEW BIRD FOR BRET

Lab associate Bret Whitney and his colleague Jan Pierson have discovered a new bird species, as yet unnamed, in Madagascar. Whitney's talent for identifying birds by the sounds they make led to the discovery.

Whitney and Pierson, both guides for the tour company Field Guides Incorporated, first noticed the bird in November 1992 in a humid, ridgetop forest near a wildlife reserve. It was Whitney's first visit to the island nation, so he was sorting out the new voices in the dawn chorus; one song didn't seem to match any of the "birds in the book." By recording and replaying the mysterious song, the pair lured a warblerlike bird into view. "We were in shock," says Whitney. "We knew we were staring at a bird unknown to the scientific world!"

Scientists think the drab-green bird, which seems to be fairly common at high elevations in eastern Madagascar, belongs to the family *Sylviidae* (Old World Warblers). This large group of small, confusingly similar birds can be as baffling to birders as North America's *Empidonax* flycatchers. Tom Schulenberg of Chicago's Field Museum, who is studying the new bird's genetic material, says, "Right now, all we know for sure is that it's definitely a new species."

Whitney's recording of the new species will be archived at the Lab's Library of Natural Sounds.

ARCTIC PEREGRINE PROPOSED FOR DOWNLISTING

The U.S. Fish and Wildlife Service (USFWS) has proposed removing the Arctic Peregrine Falcon from the endangered species list. A final decision is expected by September 1994.

The falcon made the list as a threatened species in 1970; DDT and other pesticides probably caused the decline of this subspecies of *Falco peregrinus*, which breeds on the Arctic tundra. After the U.S. Environmental Protection Agency restricted the use of DDT in 1973, populations slowly rebounded.

Arctic peregrines make up 75 percent of all the Peregrine Falcons in North America, says USFWS biologist Ted Swem, who adds, "It's especially exciting that these birds recovered completely on their own, without a captive breeding program like the one in the lower forty-eight. This means that the restored populations come from the same genetic stock as the original populations."

TIM GALLAGHER

A newly banded Arctic Peregrine Falcon, above, is about to be released to continue its migration.

COMPILED BY CYNTHIA BERGER

My Turn

WORKING FORESTS: HYPE OR HOPE?

HELEN LONGEST-SLAUGHTER, NATURE IMAGES, INC.

In our Autumn 1993 issue, we published an article entitled "The Working Forests of Maine." The author, Laurel Kornhiser, described the work of John Hagan, a biologist at the Manomet Observatory who is studying how timber industry practices affect neotropical migratory birds nesting in the forests of Maine. That article prompted this exchange:

"Working Forests" Message Deceptively Upbeat

by Stephen Ells

BOOTS GARRETT

"The Working Forests of Maine," by Laurel Kornhiser, is a stunning bit of PR. I think the article misses the forest for the trees. It seems designed to lull the reader into believing that current clearcutting practices in the Northern Forest benefit neotropical migrants. What concerns me is not the research itself, which sounds interesting, but the way sweeping and reassuring conclusions are drawn from its first-year results to create the overall impression that all's well with neotropical migrants as they breed in the industrial forests of Maine. The linkage between the facts and this reassuring opinion is missing, however. The problems are far more complex.

During my years as the U.S. Environmental Protection Agency's Director of Environmental Review for New England, I became aware of both the development of the industrial forest in Maine and the large aerial pesticide spraying programs. I also noted the illusory protection for the environment that federal pesticide laws provided. I feel continued concern about the effect of the following forest practices in Maine:

- For the past 20 years, at least 120,000 acres of forest per year have been clearcut or nearly clearcut—in an already heavily altered environment.
- In addition, up to 120,000 more acres of forest per year have been fragmented, both before and after the passage of the Forest Practices Act. In other words, an amount of forest perhaps equal to the amount actually clearcut has been severely degraded by edge effect, "island" isolation, road construction, and cutting practices that, though technically not clearcutting, are equally harmful to forest habitat for breeding birds.
- Modern tree harvesting equipment is startlingly efficient. It is capable of quickly reducing a large forest to a scarred and barren field that is unlike any natural habitat and is slower to regenerate.
- Ecological preserves and corridors are woefully deficient.
- Management practices such as monoculture plantings and the regular use of herbicides by most companies (up to 80,000 acres were treated per year in the 1980s) eliminate deciduous trees and favor fir, which is the preferred food of the spruce budworm.
- Spruce budworm outbreaks resulted in a 14-year program (during the 1970s and 1980s) in which pesticides were sprayed over an average of 1.5 million acres of Maine annually. Initial spraying to contain the outbreak started in 1954, with DDT the pesticide of choice until 1967. In one year at the peak of the outbreak, three-and-one-half million acres of Maine forest and nine million acres of Canadian forest were sprayed. The spraying in Canada continues even now; the spraying in Maine has been suspended until the next inevitable and industry-enhanced outbreak.

Are these the forest practices of which *Living Bird* says, "What's good for timber companies can also be good for birds"? To me these practices sound like warfare on the ecosystem. Clearcutting results in a massive simplification of the biodiversity of the affected environment. It eliminates many species and much structural diversity. It's not clear that the forest has the ability to recover within the reasonable future.

Furthermore, in the new industrial forest, timber companies are likely to follow clearcutting with further harmful management practices. They will replace the original multi-aged forest of mixed spruce-fir and northern hardwood with an even-aged stand of herbicide-selected fir, which will be cut before it attains the diversity and characteristics of a mature forest. In other words, after a clearcut, trees may grow back but the forest probably won't.

After a clearcut, trees may grow back, but the forest probably won't

I agree with researcher John Hagan that other practices—the increased amount of edge in a mosaic of 250-acre clearcuts, the breaking up of large tracts into a clearcut checkerboard, and the loss of mature forest habitat—are also real issues for the survival of forest species. But the solution discussed in the article (permitting even larger clearcuts) neither expresses the full range of options nor reflects recent history. Prior to 1990, when no maximum cut size existed, the timber industry did not take the opportunity to set aside large reserve tracts. Indeed, in many cases, they simply cut down everything from horizon to horizon. The real problem is not the 250-acre limit on clearcutting; the problem is clearcutting itself and the industry's appetite for it.

Perhaps the menu of solutions suggested in the article was constrained by the study's purpose: to "recommend management techniques that might mitigate these effects *without compromising the forest's economic value or ecological balance.*" [This quotation is from another article by Laurel Kornhiser that appeared in the Winter/Spring issue of the *MBO Quarterly*. Emphasis added.]

Conceivably, however, a full range of solutions might include banning or severely limiting clearcuts or near-clearcuts, limiting road construction, requiring more conservative management practices and only sustainable cuts, eliminating pesticide and herbicide applications, and most important, setting aside true, large, carefully designed, permanent wild reserves and effective corridors.

I share Dr. Hagan's hope, which he expressed in another article, that Maine's Northern Forest can be an important breeding habitat reservoir for neotropical migrants, and I look forward to the results of his study and discussions of how that objective can be achieved. But how can forest practices that have shown such a bias for the primacy of economic gain be trusted to protect environmental values?

We Need Data to Make Decisions

by John Hagan

REBECCA HAGAN

Mr. Ells is concerned that Laurel Kornhiser's article lulls the reader into believing that current clearcutting practices are a benefit to neotropical migrants. We at the Manomet Observatory (MO) understand the conservation issues surrounding neotropical migrants as well as anyone. Manomet hosted an international symposium on the topic at Woods Hole in 1989; this meeting is widely credited with bringing national attention to this problem and has led to an ambitious federal, state, and private cooperative conservation program called *Partners in Flight.* Such cooperation is a rare but much-needed approach to environmental problem-solving.

The purpose of the study described in the article is very specific: to understand the habitat requirements of Northern Forest bird species, and to evaluate the landscape effects of industrial forestry on birds. Besides clearcutting practices, Mr. Ells raises a plethora of concerns about Maine's forests, including overharvesting on a large scale, application of pesticides, and plantation forestry. These topics are very important to me as well, and I share many of his concerns. But they are beyond the scope of our current study. In this letter I will elaborate on points for which I may offer insight.

One of Mr. Ells's primary concerns is clearcutting. There is no question that a clearcut is unsightly, whether large or small. The more relevant question for environmentalists should be, "Is clearcutting ecologically bad?" The answer is, yes and no. We need to dispense with the notion that "good" or "bad" can be uniformly applied to a particular forest practice. The challenge is to maximize the "good" and minimize the "bad." To do this we must document and examine all aspects of an issue. When we have the facts, we can form an opinion.

Data from my study in northern Maine show that avian diversity is enhanced by industrial forest practices, including clearcutting. This statement is based on 774 10-minute counts of birds in all habitat types, from clearcuts to mature hardwood and softwood. Many species prefer the early stages of forest growth that result from clearcutting, including the Chestnut-sided Warbler, Mourning Warbler, Magnolia Warbler, Nashville Warbler, Common Yellowthroat, and Lincoln's Sparrow, to name a few. Clearcuts, and the scrubby habitats that follow them, are not the biological deserts many people think they are. The increase in early successional habitats as a result of clearcutting in the last 20 years has caused dramatic increases in these species in our study area. With the exception of the Lincoln's Sparrow, these are all neotropical migrants, some of which are declining at significant rates in the Northeast. All of these species are also ones that bird watchers enjoy. It is reasonable to suggest that clearcutting is working to offset regional or national declines in these species.

At the same time, clearcutting or timber harvesting by any means comes at the expense of mature forest habitat, which is used by many other neotropical migrant species, such as the Blackpoll Warbler, Bay-breasted Warbler, Red-eyed Vireo, Ovenbird, and Black-throated Blue Warbler. Some of these species are also showing declines. The question of whether this species "exchange" is good or bad was not addressed in the *Living Bird* article.

The important question is whether the creation of early successional habitat is compromising the abundance and health of forest species. This is a difficult question to answer because the word "compromising" has different meanings for different people. If Ovenbird abundance decreases by 50 percent in our study area but viable populations remain, is that being "compromised?" Or does a 5 percent loss of abundance mean the species is compromised? Before we can answer this question, we need to know how the abundances of the various early and late successional species change as a result of industrial forestry. These are the data the Manomet study is collecting. The public can then use these data to address the definition of "compromised."

Given that clearcuts are important for many species, consider the alternatives. Assuming that evicting the timber industry from Maine is not a pragmatic solution, selection cutting might be encouraged. If a paper mill needs 2,500 cords of wood (about 100 acres of forest) to supply one Sunday edition of the *Boston Globe*, it can either harvest 100 acres as a clearcut, 200 acres as a 50 percent selection cut, or 400 acres as a 25 percent selection cut. A 25 percent selection cut might look better than a clearcut, but it would affect four times as much forest area as the clearcut method. Three hundred acres of forest *would have remained intact* (physically and ecologically) if the needed volume had been harvested as a clearcut.

This comparison is important because intact, undisturbed forest is a commodity of concern in the North Woods. Large tracts are important to many forest-dwelling species, such as the Ovenbird. Harvesting 400 acres as a 25 percent selection cut would require a much larger and more complicated road network than the 100-acre clearcut. Roads fragment forest, as Mr. Ells has pointed out.

To retain the maximum amount of undisturbed forest, larger clearcuts may be merited in situations where erosion and related environmental impacts can be effectively controlled. "Larger" does not mean "more." The principle outlined above also applies here. If harvesting can be spatially consolidated, more undisturbed forest will remain. To this end, a single large cut is preferable to many small clearcuts of an equal total area. This is a matter of geometry, not values or opinions. Moreover, large clearcuts can grow back into large, unfragmented tracts of forest. Though such stands are called "even-aged," they develop valuable vertical diversity because some tree species grow fast and others slowly. Our data show that such stands, if allowed to mature, can be important, bird-rich habitats.

My data show that avian diversity is enhanced by clearcutting

It is important to distinguish between the terms "clearcutting" and "overharvesting." They are not synonymous. While I may disagree with Mr. Ells on the acceptability of clearcutting as a harvesting technique, I share his concerns about overharvesting, whether as clearcutting or selection cutting. It is not clear to me that current rates of harvesting in Maine are ecologically and economically sustainable at the century scale. It is clear that pressures on the forest will continue. Our study is trying to understand the effects of landscape geometry on bird populations now, so that we can prepare for the future by catalyzing different harvesting regimes, if needed.

To create these solutions we need to work with the timber companies to understand the implications of their activities. There is much we don't know about the effects of industrial forestry on the populations of birds and other organisms, and supposition will not be productive. We need data, and we need the cooperation of the timber companies to collect it. We need access to their land and forest inventory data. And we need an open dialogue with the companies so that we can discuss our recommendations in the context of real-world economics. At MO we are working with the timber industry as *independent ecologists who have no constraints on dissemination or interpretation of the data.* Over 80 percent of the funds supporting our project come from private nonprofit foundations with no connection to the timber industry. The remaining 20 percent comes from a nonprofit research affiliate of the timber companies. Our conclusions will be available to the industry, government, and the conservation community alike. Whether the industry takes action based on the recommendations resulting from our study remains to be seen, but without these data and insights, how can a dialogue begin? How will change ever occur?

The other concerns that Mr. Ells raised include pesticide use, the conversion of hardwood forest to softwood spruce-fir forest, plantation forestry, and over-efficient harvesting equipment. I am not qualified to address these points in detail. The timber industry limits insecticide use to periods of spruce budworm outbreaks. We don't adequately know what impact these pesticides have on insect-eating bird populations, but I share Mr. Ells's concern.

The conversion of sites from hardwood to softwood is also a concern I share. The timber industry is shifting the relative abundance of these forest types in Maine because most paper mills prefer softwood. They use herbicides to inhibit hardwood growth, thereby accelerating the growth of softwoods. This procedure tends to speed up forest regeneration, at the expense of early successional bird species and those that specialize in mature hardwood forests. For me, the important question is not whether conversion to softwoods is an acceptable forest practice, but rather how much conversion would have to take place to put Northern Forest ecosystems in jeopardy.

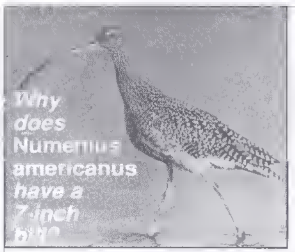
Finally, the most efficient harvesting machine I know of is the K-220 Feller Forwarder. With this machine a single worker can harvest about 15 acres per day. With its long boom, the machine can reach out and cut trees over a 60-foot-wide swath, a process that results in much less soil and understory vegetation disturbance than "less efficient" methods. "Efficient" is synonymous with neither "overharvesting" or "ecologically damaging." The machine is not the problem, but rather how industry and society use it to exploit the natural resource.

We all need to realize that the forest products industry in Maine is supplying a product that the public demands: paper. Some companies are more environmentally responsible than others, but the industry's "appetite," as Mr. Ells puts it, is a reflection of the public's appetite, and our current throw-away mentality. If we regulate the economic practicality out of the timber industry in Maine, the companies (or other companies) will continue to supply the product of demand and simply switch the timber harvest to another region or country. What uses of Maine's forests might then follow? Second-home development? Shall we simply shift the natural resource burden to, say, Central America, where many of our neotropical migrants winter, or to the southeastern United States, where many of our temperate migrants winter? Such action would be irresponsible, arrogant, and narrow-minded. We need to develop solutions to the problems we have helped create. One of those solutions relates to silvicultural practices. Manomet is seeking ways to improve silviculture for the benefit of Northern Forest ecosystems, keeping in mind that both people and wildlife have a stake in their future.

Finally, as Mr. Ells indicates, the goal of our study in Maine is to recommend management strategies that would mitigate adverse effects of forestry while maintaining the forest's economic viability as well as its ecological diversity. Economic considerations are not a constraint, as Mr. Ells states. They are a challenge. Whether we can reach our goal is as yet unknown. But until the environmental community, industry, and more broadly, society at large recognize the interdependence of environmental and economic goals, we will continue to squander our opportunities for maintaining the biological richness we have today. ■

Stephen S. Ells was founding director and chairman of the Conservation Law Foundation and, for the last decade, the EPA's director of environmental review for the New England states.

John Hagan is a senior scientist at Manomet Observatory. His research focuses on integrating economic and ecological goals in forest management, both in temperate and tropical forests.



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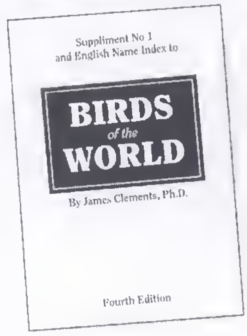

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Foul Fowl

by Stanley A. Temple

Like skunks and monarch butterflies, some brightly colored birds may be advertising their noxious qualities

Ornithological field work has its risks. My studies of raptors have taken me to remote wilderness areas, and I have occasionally worried that I might fall from a cliff, or that my boat might capsize in frigid Arctic waters. But the first time my life seemed seriously at risk, I was hardly engaged in a dangerous activity. I was watching a Pink Pigeon as it quietly ate fruit on the Indian Ocean island of Mauritius.

The pigeon, one of the last survivors of this endangered species, plucked and swallowed several fruits from a small, native shrub that I didn't recognize. Then it flew to a nearby tree and rested for some time in the late afternoon sun. At last it flew to its evening roost, to join the 27 other pigeons that made up the entire wild population of this beautiful species.

After the pigeon departed, I collected some fruits from the shrub so I could identify them later. Then I made an unfortunate decision—I tasted the fruit. I had already sampled other fruits

Hunters on the island of Mauritius avoid the colorful Pink Pigeon, left; tradition says it tastes terrible. The bird itself eats a varied diet of leaves, buds, flowers, seeds, and especially fruits—including some that humans find inedible. Could this bird be harboring plant poisons, benefiting from the protection they confer?

ILLUSTRATIONS BY JOHN SCHMITT

The media had a field day over the 1992 discovery of "the world's first poisonous bird," the Hooded Pitohui, above, whose feathers and flesh contain the same chemical that makes poison-dart frogs so deadly. Author Stan Temple thinks many other birds also use chemical defenses. Northern Flickers eat ants and also rub them on their feathers in a behavior called "anting," at right. Perhaps the formic acid in the ants makes flickers less palatable to predators.

the pigeons ate, to see whether they preferred a particular flavor.

Like many of the other fruits, this one tasted very bitter when I touched my tongue to it. Within minutes I felt a growing numbness in my mouth and throat. I panicked as I realized that the fruit was toxic.

How could the birds eat poison fruit? In a flash an explanation came to mind. According to Mauritian folklore, people who eat the meat of Pink Pigeons become deathly ill. Indeed, the bird's reputation for inedibility probably saved it from being hunted to extinction like the Dodo and other pigeon species formerly found on the island.

Pink Pigeons ate toxic plants, like the one I'd just licked, but suffered no ill effects. Instead, the toxic chemicals remained in the pigeons' flesh and poisoned unsuspecting hunters, who told gruesome accounts of their illness and avoided the bird thereafter. The same mechanism works for monarch butterflies. When they feed on milkweeds, they incorporate chemicals called alkaloids into their bodies. These alkaloids are toxic to birds, and the illness that follows a monarch meal conditions the unfortunate bird to avoid the butterflies in the future.

As my mind reeled, I frantically began to describe the episode in my journal. If I died, at least others would know why. But the symptoms gradually subsided, and I realized that I wasn't going to die. I knew the subject of toxic birds would be worth further study, though. I also learned an important lesson: never taste an unfamiliar fruit, even if birds can safely feed on it! The one I had tasted was in the same family as the Christmas cactus, and this group of plants is known for the alkaloid chemicals they produce.

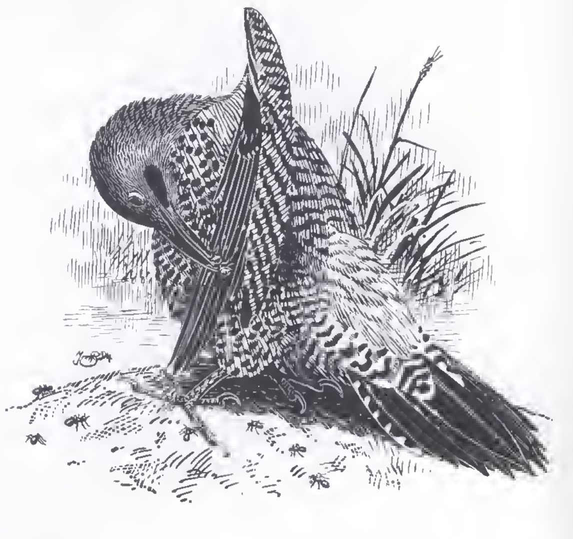
Why hadn't I made the connection between toxic plants and toxic birds before taking the fateful taste? Only a few years earlier, while I was a graduate student at Cornell University, I'd taken a course in chemical ecology, and my term paper actually dealt with toxic birds. The Mauritius Pink Pigeon is not unique among birds for its chemical defense mechanism—written accounts of poisonous birds go back as far as the Bible. Numbers 11:31-34 describes people in Israel becoming sick after eating migrant quail. Scientists conjecture that the quail may have fed on poisonous plants while migrating. The toxins were benign to the quail but poisonous to human beings.

The scientific literature holds dozens of convincing anecdotal accounts of other bird species that are either poisonous or distasteful to human beings. Many of these accounts come from ornithologists who tried to make a meal from a bird they had collected and skinned to prepare as a specimen. The most thorough inventory of distasteful birds is the work of Hugh B. Cott, a British scientist who in the 1940s systematically sampled the palatability of over 200 birds and their eggs, representing some 57 avian families.

Cott verified that some birds and their eggs are unpalatable to human beings. His unusual taste test included such unlikely and, as he found out, disgusting meals as Hoopoes, woodpeckers, and vultures. Cott reported a tendency for unpalatability to be correlated with the conspicuousness of a bird's plumage: the least palatable birds were the most conspicuously colored. The African Black Cuckoo, with its distinctive black-and-white plumage, was one of the most distasteful.

Cott's work attracted relatively little scientific interest, except as an example of ornithological esoterica. Then, last year, Jack Dumbacher of the University of Chicago rekindled interest in toxic birds when he published an account of toxicity in the Hooded Pitohui, an orange-and-black songbird from New Guinea. When he accidentally licked his hand after handling pitohuis, Dumbacher experienced numbness not unlike what I had felt when I tasted the fruit eaten by the Pink Pigeon. He and coworkers isolated a toxic chemical from pitohui feathers and flesh and identified it as the same alkaloid that makes poison-dart frogs so toxic.

Dumbacher attracted unexpected attention because earlier work by Cott and others had largely been forgotten. The media accounts, in publications ranging from *The New York Times* to *People* magazine, announced incorrectly that the



pitohui was the world's first and only toxic bird.

Although accounts of poisonous birds are amusing and perhaps provide a warning to those who might try to eat unfamiliar wild birds, they also suggest something much more interesting. Like monarch butterflies and scores of other animals, some birds may have actually evolved chemical defenses—inadvertently discovered by unfortunate human consumers—to protect themselves against their more important natural predators, especially birds of prey. Again, anecdotal accounts are suggestive.

I am a falconer, and occasionally one of my trained Merlins captures a bird that was not the object of the hunt. I remember how one Merlin reacted in disgust to the taste of a Red-headed Woodpecker that it had captured. That Merlin never subsequently pursued black-and-white birds.

I've seen similar reactions in wild raptors. For example, wild falcons clearly find Northern Flickers distasteful; they pick at the flesh and flick aside most of what they take into their beaks. These raptors may learn from experience that flickers are unpalatable. During fall migration, when falcons and flickers move along the Atlantic coast together, the slow-flying flickers should be easy prey—they're conspicuous in open habitats that offer little escape cover. Yet adult falcons normally pass up opportunities to capture flickers. Only inexperienced young falcons regularly pursue flickers—and they don't seem to relish the meal that follows a kill.

Why do flickers taste yucky? The answer may be ants, which the birds both eat and rub on their feathers in a behavior called "anting." Some ants contain noxious-tasting chemicals, such as formic acid. The bad taste doesn't protect ants from predation by flickers, but it may protect flickers from predation by raptors who have already had one nasty-tasting meal. Flickers may even have a way to help ensure that raptors don't make a mistake. The characteristic yellow-and-black flight feathers and white rump-patch are very conspicuous to a raptor attacking from above and behind; they may serve to warn (or remind) the predator of how unpalatable this bird is.

Many animals that use chemicals to defend themselves advertise their unpleasantness with a predictable combination of characteristics. They flaunt conspicuous colors such as red, yellow, orange, or black-and-white; show bold patterns such as high-contrast spots; and engage in conspicuous behaviors, such as gathering in large groups, moving in a way that attracts attention, and using postures that show off the bright color patterns. These characteristics are well suited to warn experienced predators of the consequences of an attack.

A Plague of Quail?

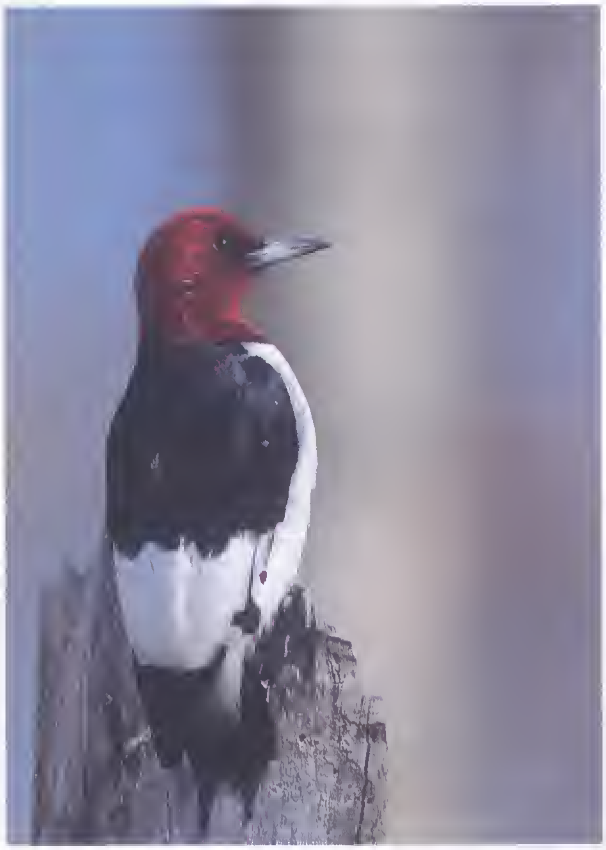
Then a wind went out from the Lord, and it brought quails from the sea and let them fall . . . all around the camp, and about two cubits deep on the ground. So the people worked all that day and night and all the next day, gathering the quails; . . . and they spread them out for themselves all around the camp. But while the meat was still between their teeth . . . the Lord struck the people with a very great plague. So that place was called Kib'roth-hat • ta'a • vah, because there they buried the people who had the craving.

— Numbers 11:31-34

This excerpt from the Bible may be the earliest known historical record of "poisonous" birds. The verses suggest a God with human emotions, annoyed by Israelites who whined for meat instead of manna while they wandered in the desert. He sent them quail; but people who ate the meat became ill, and some even died. Scientists conjecture that perhaps flocks of migrating quail, passing through the Middle East en route from Europe to Africa, had feasted on berries or seeds that were toxic to humans. The engraving above, from *Historien des Ouden en Niewen Testaments,* depicts the Israelites gathering quail as they fall from the sky.

Scientists have coined a term, "aposematism," to describe this combination of chemical defense and warning signals. Most of the scientific research on aposematism has dealt with insects and other invertebrates; some other examples of aposematic animals include skunks, the brightly colored poison dart frogs found in neotropical rainforests, coral snakes, and some coral reef fish. The flicker fits the pattern of aposematism very nicely, with its yellow (or red in the western race), black, and white coloration and the boldly displayed, high-contrast white spot on its rump.

Many other birds show what seem to be aposematic features. Consider the Cock-of-the-Rock, a spectacular orange and black bird that makes itself very conspicuous as it gathers in communal display areas. Could this species be warning predators that it is chemically defended? I think the chances are good that the answer is yes, and that the warning is directed toward highly visual raptors rather than toward color-blind mammals and reptiles, which rely more on the sense of smell or hearing to find prey. Many of the conspicuous signals birds use are ideal for warning raptors but probably less effective with mammalian or reptilian predators. For example, wing patches, tail spots, and rump patches are ideally positioned to be seen by a pursuing raptor.


CRAIG MOKMA

This Red-headed Woodpecker's boldly contrasting colors could be sending a signal to bird-eating raptors: "Back off! I taste bad!" Many animals known to be noxious flaunt black-and-white patterns or yellow, orange, or red—think of skunks and coral snakes.

If you look at birds in all their diversity, fruit-eating birds as a group seem to be especially conspicuous and perhaps aposematic. Could these birds be using chemicals borrowed from the plants they eat to defend themselves from predators? Birds such as the Pink Pigeon might be doing this—if they are able to retain the chemicals in their bodies, and if they can tolerate the toxins better than raptors can. By storing chemicals obtained from the food they eat, these birds would avoid the complex and energy-demanding process of making defensive chemicals from scratch inside their bodies.

For that term paper on toxic birds I wrote while I was a graduate student at Cornell, I tried to find out whether fruit-eaters are more likely than non-fruit-eaters to have typical aposematic features. I pored over illustrations in field guides and scored plumage traits for hundred of birds.

Bold colors seem to make a bird dangerously conspicuous to predators. But the dangers of visibility could be outweighed by one of several advantages. For example, bright colors might help a bird defend a territory, attract a mate, or recognize an individual of the same species. I wanted to see if any of these advantages could explain why potentially aposematic traits should be so prevalent in fruit-eating birds.

If a bird uses conspicuous signals as a part of its arsenal for defending a breeding territory, the conspicuous signals should be used primarily in the context of territorial disputes. They should be hidden at other times, to avoid making the bird more vulnerable to predators. The usually hidden red epaulets of Red-winged Blackbirds or the spectacular crests, usually concealed, of some flycatchers are clearly used in this way. I didn't find any correlation between these normally hidden signals and any particular diet.

Similarly, if a bird uses conspicuous signals to attract a mate, it should use the signals only in a mating context, and not display them at other times. For example, grouse often flash colorful skin patches or feathers during their courtship displays. Again, I didn't find any correlation between birds that used these types of signals and a diet of fruit.

Finally, if closely related birds use conspicuous signals to recognize members of the same species, the signals should be prevalent in taxonomic groups in which several close relatives have overlapping ranges. I found no correlation between the frequency of bright colors or bold plumage patterns and the number of coexisting species in a family.

What I did find was that fruit-eating birds were five times more likely than other species to have boldly conspicuous colors that contrasted with their normal background. They were also three times as likely as other birds to be gregarious, according to the life history accounts. If fruit-eating birds are defended by chemicals in their diet, this might explain why these birds are so brightly colored, even when it seems to make them dangerously conspicuous to predators. They might be aposematic.

Although birds are among the most colorful and conspicuous animals, ornithologists so far have not embraced aposematism as an explanation for many of the spectacular visual signals that birds send to the outside world. Indeed, no unified theory exists to explain the enormous variety in birds' plumage. Future research will almost certainly provide evidence that many birds are sending signals with meanings far more complex than we realize. In the case of brightly colored and boldly patterned plumage, the message may be in the eyes of the beholder. What seems beautiful to the human eye may be a disgusting warning to predators. ■

Stanley A. Temple is the Beers-Bascom Professor in Conservation at the University of Wisconsin in Madison and a member of the Lab's administrative board.

Further Reading

Hallowell, Christopher. "The Hooded Pitohui's Poisonous Secret." *American Birds*, Winter 1992.

TIM GALLAGHER (3)

The Mighty Sapsuckers Ride Again!

Spring is here . . . Can Big BirdWatch '94 be far behind? On May 14, 1994, big day teams from throughout the land (and as far away as Britain) will be locked in combat in New Jersey, vying to see who can find the most bird species in the state within 24 hours.

We'll be there, too. For the eleventh year in a row, our resident big-day team will join the fray. Last year the Sapsuckers hit the 200 mark for the first time. Will they be able to top that score this year? Is it remotely possible that they may even beat all the other teams? Anything's possible!

Won't you pledge your support for the Sapsuckers? Watch your mailbox for details.

Big BirdWatch '94

From the beaches to the cities and all the fields, swamps, and woodlands in between, the Sapsuckers, above, scour the Garden State for birds. At right, "On to New Jersey!" Lab staffers launch last year's team.

OF BIRDS *and* BASEBALL

by Ted Levin

Double your pleasure at the old ball game

Watching baseball and watching birds require similar skills. Both employ patience and imagination, sometimes deep thought; both progress slowly, appear boring from a distance, but are punctuated by bursts of joyous activity; neither is hampered by time. I love the vicarious thrill I get when a base runner breaks for second or a flight of geese crosses in front of the moon, and if these events occur simultaneously, which once happened at Shea Stadium, I feel something close to ecstasy.

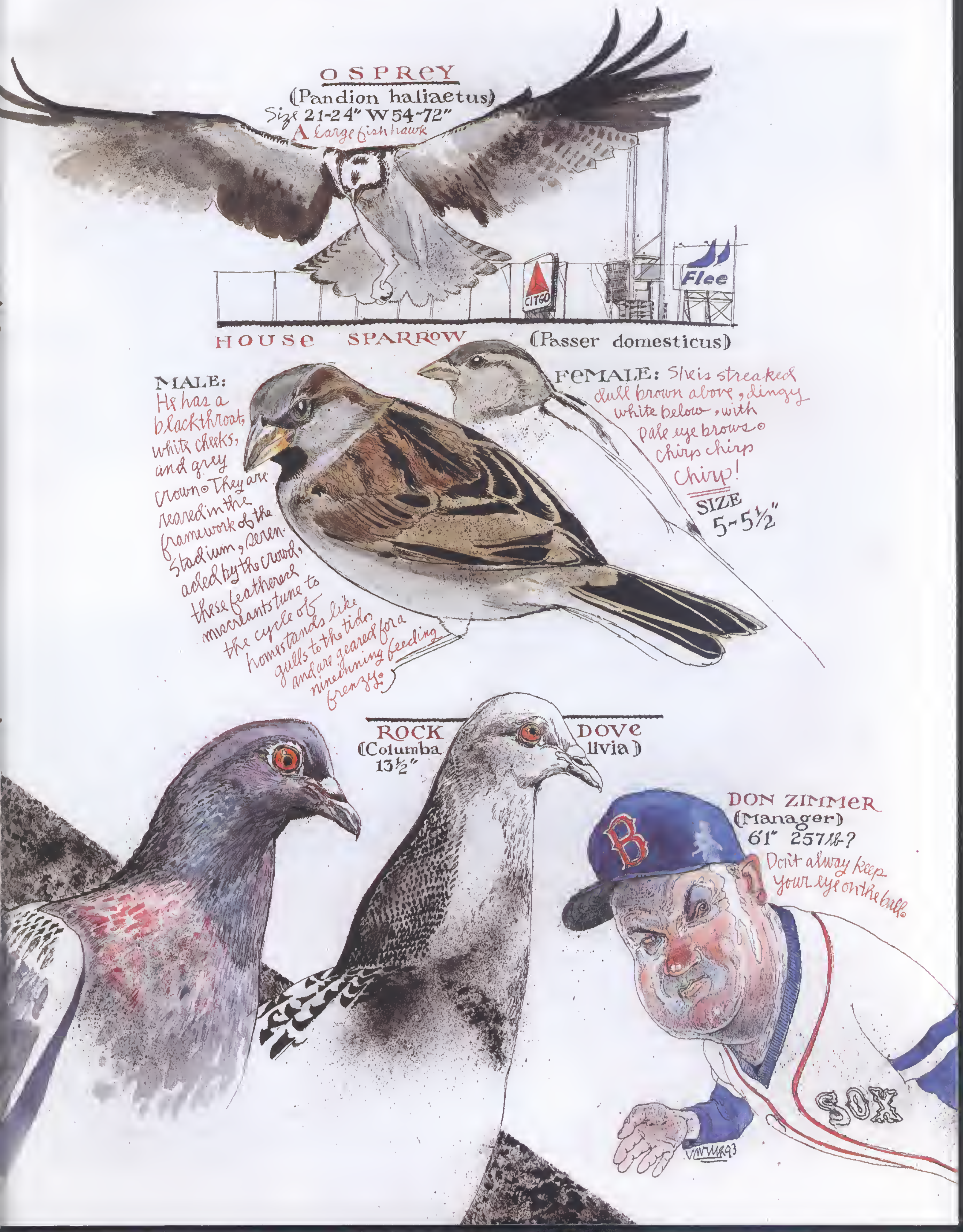
In my life there is no clear line between nature and baseball. I'm a nature writer and photographer, and when I break away from my work, I track baseball. But I never really break away. A few Aprils ago, for instance, while 46,000 people watched Jim Abbott lose his major-league debut to the Seattle Mariners, I watched a dozen Vaux's Swifts catch white moths above Anaheim Stadium, pirouetting like a gaggle of disenfranchised shortstops. The small, sooty-colored swifts were a life bird for me, a notch on my North American list, a bird I had hoped to see migrating across the Mojave Desert. It was the first life bird I ever saw at a major-league stadium (though I once recorded two "lifers," an Inca Dove and a Great-tailed Grackle, at a fast-pitch softball game in Tucson).

On another occasion, one youthful summer night in the South Bronx, I watched a Barn Owl ply invisible currents high above the bleachers, bathed in the glow of Yankee Stadium. A ballpark owl is a rare event—as rare, perhaps, as slow-footed Mo Vaughn stealing second base. Maybe rarer.

Over the years I have discovered that major-league ballparks are good places for bird watching. With very few exceptions, they hug migration flyways—the Atlantic and Pacific coasts, the Great Lakes, the interior rivers. Ohio River Purple Martins surge above Cincinnati's Riverfront Stadium. At Veteran's Stadium in Philadelphia, it's Barn Swallows; at the Oakland Coliseum, Violet-green Swallows. But Boston's Fenway Park—nestled along the Charles River and the Atlantic Ocean—may be the best ballpark in America for watching birds.

That is one reason why I am here with my son Casey, who is five and at his first major-league game. I tally birds and watch the Tigers and the

ILLUSTRATIONS BY JACK UNRUH



OSPREY
(Pandion haliaetus)
Size 21-24" W 54-72"
A large fish hawk

HOUSE SPARROW (Passer domesticus)

MALE: He has a black throat, white cheeks, and grey crown. They are reared in the framework of the stadium, serenaded by the crowd, these feathered miscreants tune to the cycle of homestands like gulls to the tides and are geared for a nine inning feeding frenzy.

FEMALE: She is streaked dull brown above, dingy white below, with pale eye brows. chirp chirp Chirp!

SIZE
5-5½"

ROCK DOVE
(Columba livia)
13½"

DON ZIMMER
(Manager)
6'1" 257lb?
Don't alway keep your eye on the ball.

Red Sox take batting practice. Four grackles, as purple as twilight, fly from the John Hancock sign above the center-field bleachers as we walk toward the box-seat railing along the third-base line. While I record the grackles, our first species of the day, my son is mesmerized by Fenway's famous 37-foot-high left-field wall, a wall, I've told him, known as the Green Monster. "Papa," he says. "It's big, but not as big as a real monster. They're huge, maybe as big as this ballpark."

In more than 15 years of integrating birds and baseball, I have never seen a real Blue Jay or oriole at Fenway. But I have seen birds associated with my home in the wilds of Vermont grace the Fenway horizon. Now, as Casey and I share a frank, a Great Blue Heron—long, slender, and graceful, a DiMaggio among local birds—rises off the Charles like a lazy fly ball, passes above Lansdowne Street, over the Citgo sign and Boston Latin School, and then disappears beyond Commonwealth Avenue into the blue haze. Species number two.

Casey shifts his attention to the grounds crew readying the hoses to water down the infield. Seven House Sparrows land on the screen behind home plate. Number three. Rob Deer, the Tigers' well-muscled outfielder, fouls a pitch into the screen; the birds scatter. Mike Pessia, the usher behind home plate, leads me back to row KK, seats 136 and 137, directly below the sparrows' roost. Pessia claims that this is the dirtiest aisle in the park, particularly after a two-week road trip, when 14 days' worth of guano cakes the seats.

My single-game record for birds at Fenway is 13 species, which is also my American League record. Every visit, I see the Fenway faithful—starlings, pigeons, sparrows—busying themselves on girders and beneath rows of folded seats, feeding, socializing, procreating. Reared in the framework of the stadium, serenaded by the crowd, these feathered miscreants tune to the cycle of home stands like gulls to the tide and are geared for a nine-inning feeding frenzy: a Lucullan feast of hot dogs, peanuts, and melted ice-cream sandwiches. For them, the park is one of Boston's premier bird feeders. When a starling passes me, a wedge of Fenway Frank in its bill, I look for a nest, usually in an open pipe or concrete cavity. In early summer rowdy juveniles assault darker-colored, glossier adults under the mezzanine or above the playing field, begging, begging, begging for food—the same response the vendors provoke in human kids.

After examining the sparrow guano, I am directed by Pessia to one of his colleagues, Ronnie Morrison, Fenway's unofficial pigeon connoisseur, who ushers the right-field boxes. Morrison points out what he calls the "Pigeon Poop Capital" beneath the right-field staging. I look up. Species number four leaves on cue. When the Sox are on the road, he tells me, pigeons lunch in Boston Harbor. I ask about starlings. Morrison says that in 10 Fenway years he has never seen one. A few minutes later, a starling arrows past, stiff-winged and short-tailed, a little, dark crescent. Then another. Species number five. Morrison says, "Oh, *those* are starlings!"

Casey and I return to the third-base side of home plate as a second Great Blue Heron glides over the Jimmy Fund sign in right. A two-heron game, a footnote in my record book. But where are the gulls, Ring-billed or Herring or Black-backed? Joe Mooney, Fenway's buildings and grounds superintendent, once told me he forecasts the weather at the park by the presence or absence of gulls. When a storm passes offshore to the south of Boston, the wind pushes the gulls inland, above the bleachers, where they scavenge chicken bones after the game or settle on the empty field, bunched together facing the tempest like fish in a current, spitting up balls of fractured crab shells on the grass. For the moment, gulls ride the offshore breezes.

A baseball rolls toward the box seats. "Boys" who shave claw each other as they reach for it. Larry Herndon, the Detroit batting coach, picks up the ball and hands it to Casey, who takes his eyes off the grounds crew and, beaming with joy, hugs the ball to his chest like a teddy bear. Minutes later, Cecil Fielder bombs one over the Green Monster, a high arching fly headed toward New Hampshire, and a Merlin—a dark, robin-sized line drive of a falcon—streaks for Boston Harbor. Number six for the day and a baseball first for me. "A falcon, Casey. Look—a *falcon.*" He is oblivious to all but his trophy as he fingers the grass stain along the ball's stitching.

Roger Clemens takes the mound; the game begins. In the bottom of the third, the Sox and Tigers are even at one, and I'm stalled at six. Scott Cooper's on third, Wade Boggs on first. One out. An Osprey spirals into the blue beyond the Citgo sign as Tom Brunanasky singles to left. The Osprey tucks its wings, pinches its tail feathers, and slides down an airy chute, fast and with purpose, like Cooper headed home. Number seven, another baseball life bird.

In the top of the fourth, Clemens strikes out the side. Then the wind and the game shift. The Tigers score three runs; Herring Gulls appear, milling above Lansdowne Street, gray-winged, the color of the Yankee's road uniforms. Number eight.

By the top of the seventh inning, the Sox are down 6-2. Clemens is gone; Greg Harris is pitching, two out. Dan Gladden leads off first base, Mickey Tettleton off second, Cecil Fielder off third. Rob Deer works the count full. Two crows, above and beyond the left-center field wall, settle on a chimney to watch Deer single to left. Joe Hesketh comes on to relieve Harris and face Mark Carreon. A Great Black-backed Gull cruises over the Green Monster and flies to center. So does Carreon, to end the inning. Tigers score two runs, and I chalk up species nine and ten.

During a baseball game, species, like runs, come in flurries or trickles or not at all. Several years ago I had 13 species at

ERON (Ardea herodias)
ING SPAN 70"
ERON
and graceful,
mong local birds rises of the Charles River like a lazy
above Landsdowne Street over the Citgo sign and Boston Latin.
CITGO
Flec
Gi
The
LEAGUE
E P
IN R P
IN R
379

Fenway in less than an hour, but none after the first inning. Last August, during a well-pitched, 10-inning Frank Viola victory over the Oakland Athletics, I recorded only seven species. Maybe I was too caught up in the action on the field that night. I once missed a ninth-inning, two-out home run that turned a Boston lead into a Yankee victory because migrating nighthawks had ridden into view.

An inning later, the Sox are still down by six when Boggs singles to left. A Black-crowned Night-Heron, squat and lethargic, an avian Don Zimmer, moves above the outfield with measured beats, as though contemplating a pitching change—number 11. Casey is sleeping, lullabied by the crowd. In the bottom of the ninth, the Tigers set down the Sox one, two, three, swiftly, painlessly. A mockingbird, whose fortunes, like mine, do not depend on the outcome of this game, plucks a peanut from an empty box seat behind home plate.

I leave the stadium with two new ball park birds—Merlin and Osprey—and a total of 12 species, one short of my American League single-game record. Casey leaves with a baseball—the most recent of three generations of Levins to come home from a game with an official baseball signed by an American League president—and a fondness for the home team. "Hey, Pop," he says as we leave Fenway. "Know why I like the Red Sox? They have cleaner uniforms." ■

When not at Fenway Park, Ted Levin is home in West Fairlee, Vermont. His most recent book, Blood Brook: A Naturalist's Home Ground, *was published in 1992. He is at work on a personal natural history of subtropical Florida. This article first appeared in the May 1993 issue of* Yankee *magazine.*

CREATURES of

ART WOLFE

Taking off: Trumpeter Swans that relinquished their wild ways for winter handouts at Montana's Red Rock Lakes refuge are learning to migrate once again, with the help of the U.S. Fish and Wildlife Service.

HABIT

Can swans relearn their ancient migratory ways?

by Yvonne Baskin

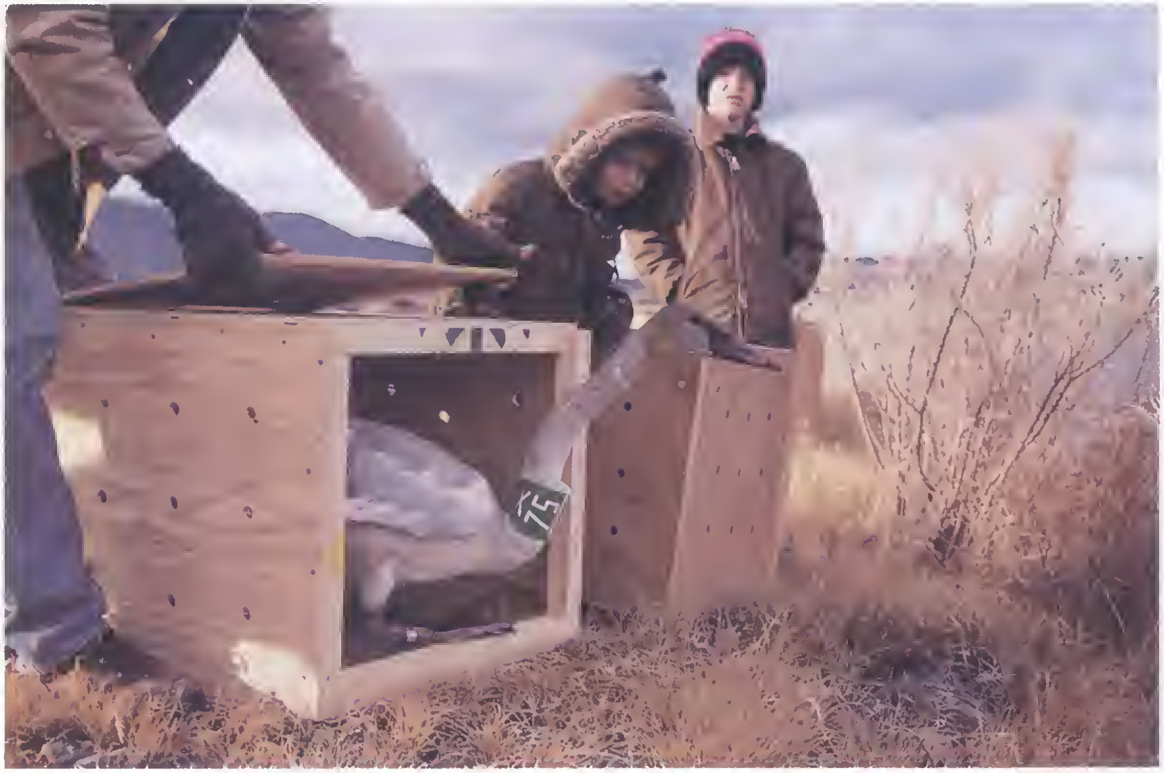
Last spring arrived gray and unusually silent in the high, frozen marshes of Montana's Centennial Valley. As the ice slowly retreated from the shallow waters of Red Rock Lakes National Wildlife Refuge, biologists on snowmobiles anxiously prowled the empty ponds for signs of returning Trumpeter Swans.

Their spirits lifted when they caught sight of a pair of swans sporting green collars. The numbers 55AE and 87AE marked them as Red Rock Lakes residents. Or former residents. For the two had been unceremoniously evicted from the refuge five months earlier, along with more than 200 other swans that had grown accustomed to socializing and freeloading on the ponds all winter. From now on, biologists say, the birds will be welcome in summer only.

Pushing the swans out of their secure refuge during the winter of 1992-93 was a bittersweet gamble. Since the refuge was founded in 1935, conservation efforts there have focused on increasing swan numbers, even if it meant luring them into lingering in the valley year-round. But now the goals have shifted. Waterfowl managers in the Rocky Mountains region are pursuing an ambitious strategy of dispersing the swans across a broader swath of their historic range and, in the process, teaching them to be self-sufficient, migratory creatures once again. At Red Rock Lakes that has meant cutting off the winter handouts of grain that once helped to bring the world's largest waterfowl back from the brink of extinction.

"I think the situation with the swans today is comparable in many ways to the Yellowstone grizzly bears that became dependent on the park garbage dumps," says Ruth Shea, a swan expert with the U.S. Fish and Wildlife Service (USFWS). "There was an artificial food source that allowed artificially high numbers of animals to be sustained year-round." At the peak of the feeding, more than 450 swans routinely wintered in the Centennial Valley, both resident birds and winter migrants from Canada who took advantage of a good thing.

JIM YUSKAVITCH (2)



At left and below right, captured swans are released at Summer Lake in south-central Oregon. Biologists hoped to give the birds a "head start" in migration by removing them from Red Rock Lakes. The birds are color marked to make them easy to identify from a distance. The relocation strategy seems to be working: three of the transported swans migrated farther south and spent the winter in California.

Yet the Centennial Valley contains almost no natural winter habitat or food supply. Adult swans weighing 20 to 30 pounds can gobble their own weight in waterweed, water milfoil, pondweed, and duck potato every day. By late October, however, waters in the Centennial Valley begin to ice over, locking the swans' food in an impenetrable deep-freeze.

It was by a fluke of history and not by choice that this inhospitable region on the western edge of Yellowstone National Park became the last stronghold of the Trumpeter Swan outside Alaska. When Europeans first settled North America, trumpeters flourished across most of the continent, winging their way from wintering grounds as far south as northern Florida, Texas, and Southern California up to summer nesting sites that ranged across the Midwest and Canada. But the new Americans developed a taste for roasted swan, swan-skin powder puffs, and swan-quill pens. Commercial hunters slaughtered the birds in vast numbers, an unchallenging task thanks to the swans' habit of circling back low over whatever has flushed them. By the turn of the century fewer than 200 trumpeters were known to have survived, making a stand in this isolated and largely unpopulated high country where the states of Montana, Idaho, and Wyoming meet.

Illegal hunting was still a major problem outside the refuge in the 1930s. So from the beginning, the refuge provided handouts of winter wheat to induce the swans to stay in the safety of the valley year-round.

The gambit worked. In the beginning the refuge had fewer than 70 year-round resident swans. Another 70 nested in Canada but wintered at the refuge. Today, what has come to be known as the Rocky Mountain Trumpeter Swan population has grown to 2,200. (The existence of a second Trumpeter Swan population that summers in Alaska and winters in British Columbia was not discovered until 1954. That flock now numbers about 14,000.)

Those 2,200 swans include about 500 who have renounced their migratory nature and, until recently, spent the entire year in or near the Red Rock Lakes refuge, and another 1,700 Canadian trumpeters that produce 300 to 500 new cygnets a year. Almost all of these Canadian swans make a beeline for the high country around the refuge in late October. Thus 90 percent of the population can be found each winter within 30 miles of Red Rock Lakes. Some spill out of the valley to the east onto the Madison River, Hegben Lake, and Yellowstone Lake. Even more have taken up residence 20 miles south across the Centennials in the waters in and around Idaho's Harriman State Park.

Shea believes the region might have been able to continue subsidizing 400 to 500 swans indefinitely. "The thing that ruined it was when the Canadian flocks discovered it," she notes. "As far as anybody knows, there were only 150 or so birds in Canada in the 1940s. Their populations really took off in the 1970s and 80s."

A decade ago, Shea and others had already begun to warn of the dangers of what she calls the "all-our-eggs-in-one-basket" phenomenon. With nearly all of the trumpeters huddled so close together through the winter, a single disease outbreak or blizzard could set the population back to its 1930s status. But it was hard to reconcile that threat with the popular image of the Red Rock Lakes swans as a conservation success story.

"Few people looked at it critically or closely enough to say 'hey, this is a semi-barnyard situation where we're pumping grain in one end and producing swans out the other.' This has no resemblance to a self-sustaining population," Shea says.

It took a brutal blizzard in February 1989 to bring the urgency of the situation home to waterfowl managers responsible for the Pacific flyway. Icy winds swept across the region, temperatures plummeted to 40 degrees below zero, and the swans' favorite waters in Harriman State Park and eastern Idaho froze solid. Savvy ducks and geese headed south to ice-free waters on the lower Snake River, but 500 swans stayed put, sitting on the ice and growing weaker. News of their plight brought local residents out into the howling storm to toss grain to them. By the time wildlife managers had negotiated with farmers for an emergency release of water from a nearby reservoir—a move that melted the ice from the shallow river—100 trumpeters had died.

After the disaster, the Idaho chapter of the Wildlife Society requested that the USFWS list the Trumpeter Swan as a threatened species. The request was denied, but the threat of listing—and the obvious public support for the stately creatures—was enough to spur the agency to action.

Since 1989 the watchword has been "range expansion," and the goal is to have no more than 10 percent of the Rocky Mountain population wintering at any one spot. The problem is that

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swans are creatures of habit, not pioneers. The migration pattern cygnets learn from their parents in their first winter usually locks in a tradition they will follow for the 25 to 30 years they may live. To break those traditions, biologists began in the early winter of 1990-91 what has now become an annual ritual: rounding up hundreds of swans and trucking them to suitable habitat in southeastern Idaho, Oregon, Utah, and Wyoming.

"We want to break this bottleneck and get them dispersed to historic haunts again," says Chuck Peck, Trumpeter Swan coordinator for the USFWS in Pocatello, Idaho. "We also want to restore them to their original condition as a migratory population sustained by natural food sources."

During the first three winters, biologists from the USFWS and various states succeeded in capturing and relocating 887 swans, a task that gets more difficult each year as the swans grow wiser and warier.

Rounding up swans in winter on shallow, half-frozen lakes and rivers has been a daunting challenge for staff and equipment. In the first winter biologists learned that net guns freeze up and Hovercraft fail quickly in Arctic conditions. The most successful strategy has proven to be chasing down swans in an airboat on dark, snowy nights, blinding them with aircraft landing lights, scooping them up in salmon nets, and swaddling them in onion sacks.

The capture is the whole battle. Once caught, the trumpeters submit to handling with passive dignity. They lie on their backs without a hiss or struggle, neck and wings drooping, black feet flopped back on their bellies as biologists weigh them, draw blood samples, and probe their genitals to determine sex and fertility. Most are crated and trucked to their intended wintering grounds by morning.

The scale of the current relocation program is unprecedented, but the notion of using Red Rock Lakes birds to found new populations is not. The small flock of trumpeters that summers in Minnesota, South Dakota, and Wisconsin and winters nearby in Iowa and Nebraska is descended largely from refuge swans. In the Rocky Mountain region, refuge birds were used to found a flock at the Wyoming National Elk Refuge. But such efforts hardly made a dent in the crowds that winter in or near the refuge.

A crucial step in reducing the winter influx of Canadian birds had to be cutting off the free food at Red Rock Lakes and forcing the long-sedentary resident swans to migrate somewhere else for the winter. But first, the refuge staff decided to give most of the cygnets born that year a head start. That meant capturing and transporting them to suitable wintering grounds rather than leaving them to follow their inexperienced parents into the unknown.

So in September 1992 the deafening whine of an airboat pierced the chill fall air as biologists rounded up 42 of the 70 trumpeter cygnets on the refuge. This was a daylight operation since the youngsters, still sooty gray and flightless, were no match for their captors. The majority were trucked off to Summer Lake in south-central Oregon, others to Wyoming or southern Idaho.

As the refuge waters began to freeze, biologists drained the feeding ponds. When no wheat appeared, most swans got the picture and left voluntarily. The rest were shooed away by arm-waving staffers on snowmobiles. By January, only a few swans were visiting the refuge to check out the ponds, then moving on.

Evicting the swans proved surprisingly easy. The other half of the challenge was up to the swans themselves: finding a place to survive the winter and then returning to Red Rock Lakes the next summer.

Apparently a large number did not survive the challenge. About 60 percent of the resident flock—110 birds, including 55AE and 87AE—had been collared to make it easier to track their progress. After they left the valley, only a third were ever spotted again: 29 of them, including 55AE and 87AE, lingered near Harriman, benefiting from a mild winter; three were seen in Yellowstone; and two cygnets made it to Utah only to be shot by hunters. Shea suspects most of the rest wandered into nearby "nooks and crannies" with good but limited vegetation, then died when the food ran out.

Only 75 to 100 swans returned to Red Rock Lakes last summer, half the usual number. This included two dozen breeding pairs. Those birds successfully fledged only 11 cygnets during "a miserable, wet non-summer," according to refuge biologist Kenneth Niethammer. The female 55AE and her mate 87AE, perhaps still too young to breed, occupied a territory but did not nest.

The refuge plans to build back to a summer breeding population of at least 38 nesting pairs, all of whom migrate out for the winter. If resident birds can't fill the bill, Niethammer and others have come up with a number of proposals for encouraging young Canadian birds to take up summer residence in the Centennial Valley.

"In February or March when the Canadian swans start back north, many of them stop in at the refuge," he notes. "One possibility is to trap some of the young birds and clip their wings so that they're forced to spend the summer with us until they molt in July. Hopefully some of them would then adopt the area as their summer home."

The most urgent priority, however, is continuing efforts to break this region's monopoly on wintering swans. "The number of trumpeters in the high country is actually increasing, despite everything we've done so far," Shea says. "We've got to figure out a way to get this population to continue moving south."

To do that, Shea believes agencies must put more effort in the future into conditions on the "receiving end." That means finding isolated, unpolluted wetlands where the shy swans will not have to compete with human recreation. And that's a tall order. "Slow-moving, ice-free water with good vegetation is in short supply, period, and it attracts lots of other waterfowl, too, so that's where the hunting pressure is going to be," Shea points out.

Moving Trumpeters Swans into Utah, for instance, brings them into conflict with the legal hunting season for Tundra Swans—a fact brought home by the shooting of the two cygnets who ventured there after being evicted from Red Rock Lakes. Hunters find it difficult to distinguish the Trumpeter Swan from its slightly smaller look-alike, the Tundra Swan. The Pacific Flyway Council has favored new regulations to absolve hunters who shoot the wrong swans. Others such as Shea would prefer to curtail the Tundra Swan hunt in areas needed for wintering trumpeters.

There are bright spots, however. One has turned out to be Summer Lake, Oregon, where many adult swans and most of the 1992 Red Rock Lakes cygnets have been released. "Three of those cygnets migrated south on their own after they were released and spent the winter on a wetland northwest of Death Valley, California," Niethammer reports. "They moved back to Oregon for the summer. This is our most promising area and may turn out to be both a nesting and a wintering ground."

If the Trumpeter Swan is to have a secure future in the Northwest, wildlife managers will have to find, or create, more sites like Summer Lake. ■

Yvonne Baskin is a California-based science writer who often winters in Montana. She is a frequent contributor to Discover *and* Science *magazines, among others.*

For more information, write to: The Trumpeter Swan Society, 3800 County Road 24, Maple Plain, Minnesota 55359, or call (612) 476-4663.

Further Reading

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At left, a Trumpeter Swan rests at river's edge in Yellowstone National Park. The magnificent birds once flourished across North America, before settlers arrived and—with a taste for roasted swan, swan-skin powder puffs, and swan quill pens—nearly caused their extinction. The Red Rock Lakes refuge allowed populations to rebound; now they must disperse to other habitats.

A Birder's Guide to
SPOTTING SCOPES

by Tim Gallagher and Heather Gerhart

Lab reviewers compare the latest scopes for birding

One thing we learned quickly while conducting this scope review is that scopes are a heck of lot harder to compare than binoculars. Think about it: Each binocular has only one pair of built-in eyepieces. To run a comparison test you just get a stack of binoculars and compare them side by side in a variety of situations. What could be simpler? Most scopes, on the other hand, have optional, interchangeable eyepieces. With one scope model, you might have the choice of half a dozen or more different fixed-power eyepieces and a couple of zoom eyepieces. To make matters worse, a scope may excel with one eyepiece while being nearly useless with another.

To simplify matters, we decided to compare each scope using eyepieces of exactly the same power, if available. We chose the 20X-60X zoom eyepiece, which is popular with many birders because of its versatility. Optical purists may cringe to read this. The conventional wisdom has always been that zoom eyepieces are never as sharp and bright as fixed-power eyepieces. This was largely true in the past, but recently several optical companies have developed zoom eyepieces that are excellent for birding. Considering the convenience of zoom eyepieces and the fact that many of them have improved so drastically, we can no longer see any reason to opt for fixed-power eyepieces.

TIM GALLAGHER (2)

We had at first considered comparing all the scopes using 20X wide-angle eyepieces, which are also popular, but decided against it because there's so much less difference between the scopes at this power. Let's give them a real test, we thought. Zoom them from 20X to 60X on a dreary day and see which ones deliver the clearest, most watchable image.

A dreary day is just what we got. Instead of conducting this review during the long, balmy days of summer, as we usually do, we opted for late October. It sounded like a great idea when we thought of it. But later, as we stood shivering under leaden skies with snow threatening, we had our doubts.

Six birders participated in (or, should we say, endured) the review. Four were present or former members of the Sapsuckers—the Lab's resident big day birding team—and have competed at least twice in New Jersey's annual World Series of Birding. The reviewers included Ken Rosenberg, senior scientist of the Lab's Bird Population Studies program, Kevin McGowan, curator of Cornell's Bird Collection, Ned Brinkley, a Cornell grad student, Cynthia Berger, managing editor of *Living Bird*, Heather Gerhart, Crow's Nest Birding Shop manager, and Tim Gallagher, editor-in-chief of *Living Bird* and past captain of the Sapsuckers.

As you might expect in a review of this kind, the top contenders also tended to be the most expensive scopes. In terms of brightness and clarity at high powers, the Questar was unbeatable, which is no doubt the reason that most major bird tour companies carry one along on all their trips. This scope can bring in a recognizable image of a bird at impossibly long distances. The Questar switches easily from low-power to high-power by turning a tiny lever. One thing that might bother some people is that the image is reversed—if you pan the scope to the right, the image in the eyepiece moves to the left—but Questar fans claim that this is easy to get used to. The worst thing we can say about the Questar is that it costs at least twice as much as any of the other top-rated scopes. Ned Brinkley summed up the reviewers' opinions well: "Questars are the toys of the super-rich . . . I want one!"

Moving down into a more affordable price realm, we found four outstanding spotting scopes in the $1,000 to $1,600 range: the Kowa Prominar TSN-4, the Bausch & Lomb Elite 77mm with ED-prime glass, the Optolyth TBG-80 HD, and the Swarovski ST-80. For several years, the Kowa TSN-4 has been the undisputed champ in its class. Its fluorite objective lens and excellent zoom eyepiece provide a bright, clear image, even in poor light. With all these great contenders emerging on the scope market, the venerable TSN-4 wobbled, but did not quite topple from its place at the top of its class. According to Cynthia Berger, the TSN-4 had the most natural-looking color of the scopes we tested. And Ken Rosenberg, who owns a TSN-4, said that after comparing his scope side by side with the other top scopes, "I can see no reason to prefer any of the others over mine."

Before we move on to the next scope model, however, we should offer one word of caution about the Kowa scope line: a number of birders have complained about Kowa's uneven quality control. It appears that not all Kowa scopes are created equal. Some individual scopes of the same model seem superior to others. Ken Rosenberg's battered five-year-old TSN-4, for example, was noticeably sharper than a brand new TSN-4 we set up next to it. This should not necessarily discourage you from purchasing a Kowa scope if you are so inclined, but *do* be sure to buy it from a dealer who will exchange your scope if you're dissatisfied for any reason. Hopefully, the top managers at Kowa will get the message and be discouraged from sitting on their laurels.

The other scopes in the top group are definitely worth looking at. You might find that some of their features make them better than a TSN-4 for your particular needs. The Bausch and Lomb Elite 77mm with ED-prime glass echoes many of the good points of the TSN-4: it has a convenient, easy-to-use focusing knob that allows you to change the focus with one finger, bayonet-mounted eyepieces, a built-in, pull-out lens shade, and it produces an equally bright, sharp image. Most of the reviewers liked the look and feel of the Bausch and Lomb scope more than the Kowa. While looking through this scope, however, we did notice a slight yellowish tint that was not present with the other scopes. The color shift is probably not pronounced enough to cause confusion in bird identifications, and it may be something that is only detectable on a bleak day. The Bausch and Lomb's 20X-60X zoom eyepiece did not perform as well for eyeglass wearers as the Kowa's.

In the Lab's latest scope tests, the Questar, far left, soared high above the competition in terms of brightness, clarity, and overall quality. But the Kowa Prominar TSN-4, above, still clings to the top spot in its price class.

The Optolyth TBG-80 HD is also a very good scope, only marginally less bright and sharp than the two mentioned above, and uses a similar knob mechanism to focus. Some birders may prefer this scope because of its ruggedness and armor coating. We took one with us on the World Series of Birding a couple of years ago, and it definitely proved its worth in the field. On the down side, when the eyepiece is zoomed out, the field of view is very narrow, especially for someone who wears eyeglasses. In addition, the TBG-80 HD uses screw-in eyepieces, which are more trouble to switch quickly in the field than bayonet-mounted eyepieces, and there's also a danger of cross-threading them.

Of the scopes in our top class, the Swarovski ST-80 is the only one that doesn't have either an ED-prime or fluorite objective lens. Both ED (Extra-low Dispersion) glass and fluorite help to bring

Scope description	*Objective tens diameter*	*Eyepiece*	*Case*	*Armor*	*Waterproof*
Group I (over $2,000) *In a class by itself*					
Questar*	89mm	54x, 87x	Yes	No	No
Group II ($1,000-$2,000) *Top of the line models for professionals and serious amateurs*					
Bausch & Lomb Elite with ED Prime Glass	77mm	20x-60x zoom	No	No	No
Kowa Prominar TSN-4	77mm	20x-60x zoom	No	No	No
Leupold 12x-40x 60mm variable	60mm	12x-40x zoom	Yes	Yes	Yes
Nikon Fieldscope II-ED	60mm	15x-45x zoom	Yes	No	Splashproof
Optolyth TBG 80 HDF	80mm	20x-60x zoom	No	Yes	Yes
Swarovski ST-80	80mm	20x-60x zoom	No	Yes	Resists
Group III ($500-$999) *Mid-range models for serious birders*					
Bausch & Lomb Elite	77mm	20x-60x zoom	No	No	No
Bausch & Lomb Elite 60mm Zoom*	60mm	15x-45x zoom	Yes	Yes	Yes
Celestron SS80+*	80mm	18mm (22x)	No	No	No
Celestron C90*	90mm	30mm(33x)	Yes	No	No
Kowa TSN-2	77mm	20x-60x zoom	No	No	No
Leupold 20x50*	50mm	20x	No	Yes	Yes
Nikon Fieldscope II with angled body	60mm	15x-45x zoom	Yes	No	Splashproof
Group IV (under $500) *For birders on a budget*					
Bushnell Spacemaster with ED Glass	60mm	22x wide angle	No	No	No
Bushnell Spacemaster	60mm	22x wide angle	No	No	No
Celestron S-50*	50mm	25x	No	No	No
Swift Panther	60mm	22x wide angle	No	No	No
Swift Searcher	60mm	20x and 40x	No	Yes	No

Each scope comparison category (sharpness, brightness, etc.) is rated on a scale from 1 to 5, 1 being the best. A plus or a minus sign indicates that the scope scored slightly higher or slightly lower, respectively, than the given rating number.

* = Price includes eyepiece

Weight (in ounces)	Approximate length (in inches)	Sharpness	Brightness	Color	Zoom rating	Eyeglass rating	Focus	Suggested retail price
70.9	11.75	1+	1+	1+	NA	1+	1-	$2,985.00
43.9	13.5	1	1	2	2	2	1	$1,400.00
41.0	14.7	1	1	1	1-	1-	1	$1,500.00
32.0	11.5	3	3	3	3	3	2-	$1,026.00
39.1	11.4	1	2	1	2	2	2	$1,090.00
46.0	15.0	1-	1-	1	2	2	1	$1,600.00
51.9	15.5	2	2+	2-	1-	1	2	$1,340.00
37.9	14.0	2	2	2	2	2	1	$ 640.00
26.4	12.25	3	3	2	3	3	2-	$ 589.95
35.0	13.5	2+	2+	1-	NA	2+	2	$ 798.00
52.0	7.75	1-	1-	1	NA	1	3	$ 920.00
41.0	14.7	2	2	2	2	2	1	$ 795.00
20.5	9.4	3	3	3	NA	2+	2-	$ 646.40
38.5	11.4	3+	3+	2	2	2	2	$ 740.00
38.4	11.6	2-	2-	2-	NA	3	1	$ 479.95
38.4	11.6	3+	3	3	NA	3	1	$ 247.95
21.0	9.0	3	3	3	NA	3	2	$ 218.00
32.0	12.4	3	3	3	NA	3	1	$ 280.00
48.0	12.6	3	3	3	NA	3-	2-	$ 460.00

Please note: Suggested retail prices are only provided as a basis for comparison.
Actual street prices vary widely and are often considerably lower.

the principal primary colors into focus together, thereby significantly reducing color fringing and enhancing image clarity and color transmission. As good as the ST-80 is now, we can't help but think how much better it might have been if the manufacturer had used ED glass or fluorite. This scope *did*, however, prove to be one of the most "eyeglass-friendly" of the ones we tested. Though the Swarovski is a little darker and fuzzier than the others at 60X, the field of view is incredible—almost twice the field of view at that power than the others have. "The Swarovski would be excellent for my research," says Kevin McGowan. "I spend long periods trying to read crow wing tags at a distance using 60X. Speaking as an eyeglass wearer, the comfort of viewing is probably worth the slight step down in sharpness from the other scopes in its class."

Unlike the other top-rated scopes, the ST-80 employs a moveable collar around its barrel to adjust its focus. None of the reviewers liked this kind of focusing mechanism as much as a focusing knob. Instead of simply turning a small knob with your fingertip, you have to grasp the focusing collar and turn it with your entire hand, which tends to shake the scope and make viewing more difficult while focusing.

TIM GALLAGHER (2)

Celestron now produces an 80mm ED scope that is less expensive than the other scopes we have so far mentioned. The Celestron SS80+ looks more like something you would use for stargazing than for birding, but it *is* an impressively bright scope. We spent some time watching Mallards and Black Ducks with it next to the pond in Sapsucker Woods, using the 18mm (22X) eyepiece that comes with the scope. The SS80+ captured the feather detail of these waterfowl very well. This scope employs an external, rack-and-pinion style focusing mechanism, which may make it less moisture resistant than the others. It also has a narrow field of view for eyeglass wearers and is not quite as bright and sharp as the scopes in the top group.

A surprising runner-up to the 77mm and 80mm scopes is the Nikon 60mm Fieldscope with ED-prime glass. The numbers 60mm, 77mm, and 80mm refer to the size of the objective lens at the front of a scope—the larger the number, the larger the lens size and the more light-gathering ability a scope has. But with only a 60mm objective lens, this scope delivers brightness and clarity that rival the best of the big scopes. And, for non-eyeglass wearers, the Nikon 20X-45X zoom lens is excellent. The only negative comments we have for this scope are 1) it has the focusing collar on the barrel, 2) it uses screw-in eyepieces, 3) for eyeglass wearers, the zoom lens has a very narrow field of view at mid- to high-power, and 4) in extremely low light, the 60mm objective lens will not deliver as much brightness as a 77mm or an 80mm lens. But if space and weight are concerns for you, this lightweight, compact scope is definitely worth serious consideration.

The Bushnell Spacemaster, the scope everyone used before the Kowa invasion, is still around, and it's now available in a reasonably priced ED model. Although we prefer the general look and feel and especially the focusing mechanism of the Spacemaster to that of the Nikon ED Fieldscope, the image it produces is nowhere near as bright and sharp as the Nikon's. As we mentioned in our last scope review, the Bushnell zoom lens is particularly poor. Equipped with a 22X wide-angle eyepiece the Spacemaster ED is not bad—but for an ED scope, it's disappointing.

At this point in the comparison we brought out some of the non-ED models made by the same manufacturers as the top contenders. We found that the Nikon Fieldscope with ED-prime glass far surpasses its non-ED sister scope, which gives you some idea of what a difference the type of glass can make in the quality of a scope. Comparing the Kowa TSN-4 and TSN-2 scopes side by side under adverse lighting conditions was also very interesting. The two scopes are identical except for the fluorite lens (and whopping price tag) of the TSN-4. The TSN-2 held its own remarkably well with its pricier cousin at the lower powers, but zooming all the way up to 60X in bleak light, the TSN-4 gave a graphic demonstration of its superiority, still providing a sharp, bright image when the TSN-2's image had turned dark and fuzzy. Of course, you can buy two TSN-2s for the price of one TSN-4, which makes the less-expensive scope a pretty good bargain.

The non-ED Bausch and Lomb Elite 77mm scope is inferior to the same scope with ED glass, but it compares favorably with the Kowa TSN-2. Before the new Elite's introduction last year, the TSN-2 had pretty well captured the market in its price range. Now it has a stiff competitor. The two are similar in price, feel and function, and optical quality, but several of the reviewers said they preferred the Elite slightly over the TSN-2.

One decent inexpensive scope we tried out was the Swift Panther 60mm equipped with a 20X eyepiece. Though it doesn't really compare with the high-priced scopes, it's a good buy if you need a little more power than your binoculars will deliver but you don't want to go too far into hock. We also took another look at the Swift Searcher, a scope that received a poor rating in our last review. This scope has been improved, and it performed noticeably better this time. The Searcher is an unusual design. Two eyepieces—a 20X and a 40X—are mounted on a swiveling turret that you can twist around to change the magnification power of the scope. The turret mechanism represents a noble attempt on the part of the manufacturer to provide multiple magnification powers using two fixed-power eyepieces rather than one, possibly inferior, zoom eyepiece. Unfortunately, none of us really cared for the way it works. Swiveling from 20X to 40X, you usually have to refocus the scope, and sometimes you also have to relocate the bird you were looking at. We would prefer it if the Searcher used a good zoom eyepiece or just a single fixed-power eyepiece. Using the 20X eyepiece, the Searcher performed as well as the Panther and the non-ED Bushnell Spacemaster. But eyeglass wearers beware: the eyepieces on the Searcher do not have fold-down rubber cups to protect your glasses.

The Celestron C90 was one of only two catadioptric scopes we tested (the other was the Questar). A catadioptric scope has a large concave mirror at the back that magnifies the image and bounces it back to a smaller mirror up front, which in turn bounces the image back to the eyepiece. This is a popular design in astronomy telescopes. The C90 provides a good, bright view in a relatively small package. It may be less rugged than a conventional spotting scope, and some birders will find it awkward to use. (The large focusing collar is especially cumbersome.) But it's definitely a great scope for the price.

Moving into the more compact scopes, we looked at the Bausch and Lomb Elite 15X-45X 60mm Zoom, the Leupold 12X-40X 60mm Variable, and the Leupold 20X50mm. The Elite has a sleek roof prism design and rubber armoring. At low power, it provides a crisp, clear, bright image, but the view deteriorates quickly as you zoom up in power, particularly if you're wearing eyeglasses. On the plus side, this scope is nitrogen-purged to make it waterproof and fogproof. The Leupold 12X-40X is also waterproof, but it is heavier, bulkier, and not as sharp as the Elite. The other Leupold, the 20X50mm, was the smallest scope we tested. It fits easily in a small backpack. Though the scope has some limitations—the 50mm objective lens is not as bright as a 60mm in dim light—it is water resistant, lightweight, incredibly compact, and produces a decent image. Most of the reviewers said they would like to have one to take along traveling if they didn't have room in their luggage for a large scope. We also looked at a 50mm scope from Celestron, the S-50, but it did not compare to the smaller Leupold in brightness, clarity, or ease of use.

As you may have discovered from reading this review, there are a lot of scopes to choose from, most with their own distinct advantages and disadvantages. How can you hope to choose between them? Ask yourself a few questions about what you require in a scope. Do you need a scope that's great in dim light? Are size and weight factors in your decision? Are ruggedness and moisture resistance important? How much money can you afford to spend? Look at the chart that accompanies this article, and compare the individual scope ratings.

Lightest and most compact of the scopes reviewed, the Leupold 20X50mm, far left, provided a good image in a tiny package, but in dim light it wasn't as bright as the larger scopes. Though the Celestron C90, above, is somewhat awkward to focus, this scope is sharp, bright, and reasonably priced.

Rather than giving each scope an overall rating, we rated the scopes in several categories—sharpness, brightness, color fidelity, zoom lens rating, eyeglass rating, and ease of focus. We'll leave it up to you to determine which factors are most important to you. For eyeglass wearers, the column called "Eyeglass Rating" should be one of the most important categories. No matter how optically sharp and bright a scope is, it doesn't do you any good if you can't see a big enough image through it. The key is to define your own particular needs. Only then can you be assured of getting the scope that's best for you. ■

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A DAY FOR THE BIRDS

by Rick Bonney, Jamie Reaser, and Martha Fischer

Celebrate International Migratory Bird Day

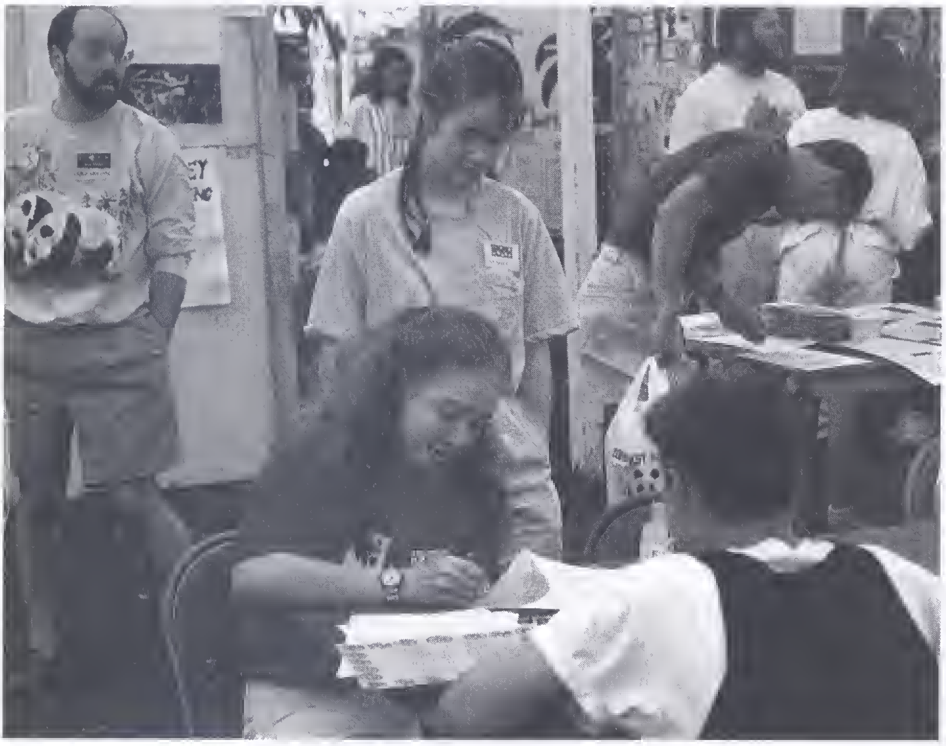
The afternoon we first talked about International Migratory Bird Day (IMBD), we thought it seemed like a good idea. But we wondered whether anyone else would think so. Would birders and conservationists accept our challenge: to go out and educate others about the wonders of migratory birds and to exhort people to help with bird conservation? Or would our proposed IMBD seem like just another Earth Day—or worse yet, like the National Celebration of the Horseradish?

We needn't have worried. A few days after that first IMBD, which took place on May 8, 1993, its success was obvious. Consider:

- In Washington, D.C., 15,000 people, including Chelsea and Hillary Clinton, visited the National Zoological Park where, at the Kid's Tent, Chelsea and her classmates educated the public on the wonders of the rainforest, winter home to many neotropical birds. Ornithologists from the Smithsonian Institution led a birding trip to Roosevelt Island, which was reported on National Public Radio's "Morning Edition."
- More than 5,000 birders participated in the second North American Migration Count, tallying 535 bird species—1.957 million birds—in 44 states and four Canadian provinces. Jim Stasz, a birder from Maryland, initiated the count and has gathered and stored the data collected by conservation clubs across the continent. Jim plans to pass the data on to the National Biological Survey so that more people will have easy access to the numbers. As the count grows and as more data are amassed, a picture will emerge of the flight paths, distributions, and abundances of songbirds during migration.
- Several states—including California, Oregon, Washington, and Idaho—had Migratory Bird Day officially declared by their governors,
- In Alaska, the Tongass National Forest hosted a mist-netting demonstration. Staff from the forest also participated in a radio talk show, wrote an article for the local paper, and presented a slide show to a college biology class.
- The Colorado Bird Observatory organized a native tree and brush planting project, distributed a youth education curriculum, and offered a one-hour program on migratory birds at a local nature center.
- In California, the Golden Gate Audubon Society raised $10,000, which was donated to the East Bay Regional Park District to purchase and restore prime wetland habitat used by thousands of migratory songbirds and waterfowl. That property had been slated for development, but will now be protected as park land.

And these are just a few of the highlights. In all, more than 120 different events took place in 44 states and four Canadian provinces. We are thrilled that this inaugural effort to educate people about the plight of neotropical migratory birds reached such a large audience across North America.

IMBD was coordinated by the Smithsonian Migratory Bird Center (SMBC) as a project of the Information and Education Working Group of Partners in Flight/Aves de las Americas. It was a perfect example of how Partners in Flight, also known as the Neotropical Migratory Bird Conservation Program,


SMITHSONIAN MIGRATORY BIRD CENTER

President Clinton's daughter, Chelsea, center above, and her classmates help with an International Migratory Bird Day event at the National Zoological Park.

can facilitate cooperation among many different agencies and groups. Partners in Flight is a coalition of more than 50 government agencies and more than 20 nongovernmental organizations, all working together to enhance migratory bird populations and the vital habitats that sustain them.

As part of the effort, the SMBC, a research and education program for the international conservation of neotropical migratory birds, produced an IMBD organizer's handbook with materials compiled from diverse conservation groups including the National Audubon Society, the National Wildlife Federation, the Rainforest Action Network, the U.S. Fish and Wildlife Service, and Zero Population Growth. The handbook (which organizers could purchase for a $5.00 photocopying charge) included information on how to run local conservation campaigns, how to improve backyard habitat for birds, children's educational activities, and much more.

CHARLA STERNE/U.S. FOREST SERVICE

Brad Andres of the USFWS shows these youngsters how to identify a songbird during a mist-netting demonstration in Alaska.

Then the folks at SMBC sat back and waited—and as you can see, the results were encouraging.

We want to expand on the successes of 1993 this year. Help us celebrate IMBD on May 14, 1994.

Our goals are simple: to heighten public awareness of neotropical migratory birds and the threats to their populations, to teach people how they can contribute to migratory bird conservation projects, and to make people more aware of the biological and economic links between North America, where neotropical migratory birds breed, and Latin America, where they spend their winters.

Our methods are simple, too. We're creating an International Migratory Bird Day organizer's packet to replace last year's handbook. If funding allows, it will include an updated handbook, a citizen's guide to migratory bird conservation (this item is presently being prepared as a joint project between the Cornell Lab of Ornithology and the National Audubon Society), sample brochures, proclamations, news releases, and more. The packet will include everything a potential organizer would need to put on an event for International Migratory Bird Day, whether it be as simple as a lecture, slide show, or bird walk, or as complex as an organized bird count or development of a conservation plan.

International Migratory Bird Day will be coordinated by the Smithsonian Migratory Bird Center, the Lab, and the National Audubon Society. For more information, write to the Partners in Flight Information and Education Working Group, c/o Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850, or call (607) 254-2440. ■

Rick Bonney is director of the Lab's Education and Information Services and chair of the Partners in Flight Information and Education Working Group.

Jamie Reaser is a graduate student at Stanford University's Center for Conservation Biology. She coordinated the 1993 International Migratory Bird Day as a staff member at the Smithsonian Migratory Bird Center.

Martha Fischer is an education assistant at the Lab and the Lab's Partners in Flight information coordinator.

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Profile

IN THE FIELD WITH JACK CONNOR

by Cynthia Berger

Good writing and good birding go together for our contributing editor

Jack Connor teaches writing at Stockton State College in Pomona, New Jersey. Today he's meeting his class at Brigantine National Wildlife Refuge, six miles from campus. The students, sophomores and juniors in sweatshirts and baseball caps, arrive in relays, four or five to a car, at Connor's post on the east dike.

They scan with binoculars and take turns peering through spotting scopes. Connor, who's wearing the owlish glasses of an academic under a funky broad-brimmed hat, radiates enthusiasm as he points out a Boat-tailed Grackle, a wedge of Snow Geese, a Double-crested Cormorant perched on a rotting post, and then, a mystery bird: yellowish, finch-like. The students flip through field guides while Connor urges them on. "Ooo, I'll let *you* figure that one out," he teases.

Wait a minute. This is a writing class?

Yes. "The Biology of Birds" is an interdisciplinary course subtitled "Writing Across the Curriculum." Later that afternoon, back from Brig, Connor flips the switch on his office computer and logs on to the campus network to demonstrate.

"Look at this," he says as he scrolls through pages of text like a grandparent flipping through baby pictures. "I have the students describe their sightings for each other in this electronic conference. It really gets them going."

The art of good writing and the science of bird study converge in Connor's course, just as they do in his *Living Bird* column, "In the Field," and in his recent book, *Season at the Point.* How Connor himself arrived at this confluence is the deliciously ironic tale of a reluctant birder.

Growing up in New Jersey, the eldest of seven children, Connor patiently resisted his mother's efforts to interest him in birds. "She used to take me on these trips," he says. "I'd look through the scope, I'd say, 'Huh,' and then I'd go for a walk or something."

Connor guarded his antipathy to bird watching in the early years of marriage to his college sweetheart, bird watcher Jesse Easton. "We lived about three miles from the Great Swamp [a New Jersey birding hot spot]," he continues. "Jesse would go over there, I'd stay home."

Meanwhile, Connor was teaching ninth-grade English, working on a master's degree in English literature, and struggling to write a novel. "My first job," Connor remembers, "I had three ties. By the end of the year the kids gave me a tie."

Then the two decided to enroll at the University of Florida in Gainesville, he to pursue a Ph.D. in English, she to finish her degree in psychology. "I wanted to teach older people," Connor remembers. "Junior high . . . ." He sighs. "A lot of your time is spent in discipline."

With the move to Gainesville came the epiphany Connor describes in the preface to his first book, *The Complete Birder.* Driving through the countryside to escape their overheated student apartment, Jack and Jesse spotted what looked like Turkey Vultures circling over a lake.

> *Even to eyes crusted by twenty-plus years of willful blindness, something looked wonderfully wrong . . . . "Jesse!" I shouted. "Eagles! Eagles! Eagles!" . . . .*
>
> *"And that's the moment I became a birder" I always say when telling this story aloud, but you don't have to be a birder to appreciate an eagle. Walking home the next day, I spotted a woodpecker on a telephone pole, opened Jesse's field guide as soon as I came in the door, and was stunned to discover that . . . [about 10 species] looked like the one I'd just seen. I grabbed the book and the binocs and raced back to the telephone pole. The woodpecker was gone. That was the moment I became a birder.*

The years that followed were a whirlwind of field trips. Life lists lengthened. And with a friend's encouragement, Connor started to write a column about birds for the Alachua Audubon Society newsletter. Still, says Connor, "it was two different things, writing for the newsletter, and being a literary person—totally split." His doctoral dissertation examined the narrative shape of the Quixotic novel; his column covered local birding highlights.

"I spent hours on that column," Connor laughs. "I didn't even sign my name. I was embarrassed; I'd only been birding a few years—a lot of people knew more than I did. But I learned a lot, because I was finally forced to put in writing what I knew. It's like what I do now for my students—if you put it in writing, if you have to flip through the book a little bit, you learn more."

Degree in hand, Connor moved back to New Jersey and began teaching at Drexel University in Philadelphia. But he was drifting away from literary criticism. "People in my field were writing things that only about three other people could understand," Connor says. "Meanwhile, I was starting to sell more journalism." He wrote an essay for *Newsweek,* a story for *Alfred Hitchcock Mystery Magazine,* a piece on the world boomerang champion for the *Phildelphia Inquirer.*

And he was birding New Jersey. "I finally realized," says Connor, "this is a pretty good state! My eyes were opened to the birds that I should have been seeing when I was ten."

Birding trips to Brigantine took him past Stockton State College. "It looked neat," Connor remembers thinking. "So close to Brig, I thought, I'd love to teach there." Then a Stockton professor called him up after reading one of his essays in the *Chronicle of Higher Education*. Would he speak at a workshop for Stockton faculty, about how to incorporate writing into other classes?

The workshop went well. About two years later, in 1984, a position opened up. "That was lucky," Connor grins. "I really love it here. They do this great multidisciplinary stuff. And it makes sense for me to be doing the kind of writing that students want to be doing in the real world."

Today Connor, Jesse, and their three children live in Port Republic, a New Jersey hamlet that helps you understand the nickname, "Garden State." Their comfortable home is filled with bird art, bird books, and birds: jays and sparrows at the feeders in the front yard, four pet parakeets and a cockatiel chattering in the back room, chickens scratching in the dust near the kitchen door. Nearby are the mill pond, ball field, and river that Connor describes in his column. Brigantine is just a few minutes' drive away.

CYNTHIA BERGER

Who says writers have to toil in garrets? Professor and author Jack Connor takes his *writing class bird watching.*

A fateful encounter at another legendary New Jersey birding spot led to Connor's first book. "There was this fellow at the Cape May Hawk Watch," says Connor. "Pete Dunne. I'd met him a couple a times, a very funny guy." So Connor queried *New Jersey Monthly* magazine: How about a profile of this fanatical hawk watcher? The magazine bought the story and requested an article about birding in New Jersey to accompany it. After the story ran, a publishing company called Connor. They'd seen his article, and they wanted a how-to-watch-birds book. "It ended up being *The Complete Birder*," says Connor.

The book was a hit with the birding community. It also brought Connor to *Living Bird* as a contributing editor—before it even went to press. *Country Journal* magazine had excerpted the chapter on identifying warblers. A *Living Bird* editor read *Country Journal*, liked the article, and called Connor. An excerpt of his chapter on bird sounds ran in our Spring 1987 issue, under the title, "Quick, Three Beers!" Then *Living Bird* signed Connor up for a regular column, "In the Field."

It began as a continuation of *The Complete Birder*: tips for identifying birds, advice on taking field notes. But Connor says his priorities have changed; he's more interested in understanding behavior. "The column that marked the change for me was the one about Hooded Mergansers on Mill Pond being chased by a gull," says Connor. "I used to bird for the thrill of the chase; now, I can stand at the local pond and say, O.K., there are no new birds out there, I'm not looking for a rarity, but this is still a neat thing to do. There *are* things to think about when you go birding other than 'what is it?'"

Connor played off the tension between birding for sport and birding for understanding in his second book, *Season at the Point*, which covers one autumn in the life of the birds and birders at the Cape May Hawk Watch. John Barstow, who edited the book for Atlantic Monthly Press (he's now editor of *Harrowsmith Country Life*), thinks Connor is headed in the right direction. "Jack's very good at explaining habitat and behavior," he says. "He helps you to understand what you're looking at, not just from the point of view of identifying a bird, but understanding how it behaves.

"Jack also does a good job with dialogue," Barstow adds. "The way he weaves it into the story—it doesn't feel forced or self-conscious. That can be very difficult to do. And his writing is very solid and careful, in the John McPhee school: full of detail and carefully rendered. I think one of the really wonderful things he's written [for *Harrowsmith Country Life*] was an article on vanishing neotropical migrants. I'd like to see him do more writing of that sort, on issues."

For Connor, the details are ever expanding. Right now, he's learning the Latin names of the marsh plants at Brigantine, and he's also studying butterflies.

And the issues? He's pursuing them on his own terms. "If I have a political purpose in writing," he says, "it's getting people interested in the out-of-doors. Most people are interested, but they don't necessarily know what to look for, or how to look at it.

"That's what I try to do, in this course and in my writing. I try to get people over to Brigantine, so they know it's there. Then when they get to vote, when they make choices, hopefully they'll choose wilderness." ■

Spotlight

LOST AND FOUND

by David Wilcove

Some tropical birds are much more common than we thought. Or are they?

Any bird watcher who has reported an unusual sighting to the local experts, only to be met with raised eyebrows and other thinly veiled signs of skepticism, can identify with Jan P. Smith. Not content merely to report the unexpected, Smith had the audacity (or courage) to claim the unbelievable: a White-winged Potoo sitting atop a dead tree near Manaus, Brazil, in October of 1985.

No one had seen this bird in over a century and a half—it was known from only two 19th-century specimens collected in coastal Brazil, hundreds of miles from Manaus. Smith's sighting, I am told, was greeted with less than unconditional acceptance. But he would have the last laugh.

A few years later Mario Cohn-Haft, now a graduate student at Louisiana State University (LSU), decided to pin down once and for all a familiar but mysterious whistle that emanated from the Manaus forest at night. Many people had heard the sound, but no one knew the singer. Cohn-Haft managed to lure the mysterious singer into view and discovered it was a White-winged Potoo.

Determined to obtain a specimen, Cohn-Haft used alpine climbing gear to hitch his way up a big tree to a platform where he spent the night whistling at potoos. Around five o'clock the next morning, a potoo swooped directly at Cohn-Haft's head and perched in the very tree where he stood. He collected it, only the third specimen known to science. Subsequent surveys revealed the White-winged Potoo to be a relatively common bird throughout that region of the Amazon.

ANDREW KRATTER

The rufous-fronted antthrush, a near-mythical bird, was rediscovered by Ted Parker in Peru.

The saga of the White-winged Potoo is only one example of the extraordinary discoveries that have revolutionized neotropical ornithology over the past 20 years. Armed with better information, especially with respect to vocalizations, ornithologists have discovered that many little-known birds of the Amazon basin are far more numerous than anyone previously believed. For example, the International Council for Bird Preservation's authoritative new book, *Threatened Birds of the Americas,* lists 320 New World birds that may be at risk of extinction, yet only about a dozen are from the Amazon basin, even though it is the site of the world's richest avifauna.

This sea-change in our understanding of tropical birds became apparent to me last summer when I returned to Ecuador for the first time in 15 years, on a bird watching tour. Our leader carried a tape recorder and a bag of cassettes filled with bird songs. Hiking through the forest, he would suddenly stop, inform the group that he had previously found a particular bird at the place where we were standing, pop the correct cassette into the machine, play the song, and more often than not—presto!—out popped a Pavonine Quetzal or a Rusty-breasted Nunlet.

At times it felt more like ordering dinner from a menu than bird watching, but what a wonderful assortment of birds we saw. From Dugand's Antwrens to Zigzag Herons, our leader had tapes of birds that only a decade or two ago were virtually mythical.

Despite the dizzying pace at which scientists armed with tape recorders are gaining new insights into Amazonian birds, many old mysteries remain unsolved, and new ones pop up all the time. In 1963, for example, LSU ornithologist John O'Neill came upon a flock of six blackbirds bathing in a stream in southeastern Peru. He collected one, and it proved to be an undescribed species, now called the Selva Cacique. It has never been seen again. Other caciques are not particularly shy or rare, making the Selva Cacique's disappearing act all the more puzzling. Another example is the recently described Rondônia Bushbird, known from a single individual captured in a mist net in 1986 and two subsequent sightings. It appears to be very rare and localized, again for no apparent reason.

Then there was the time when the legendary Ted Parker, hiking along a trail in Peru's Manu National Park, heard an unfamiliar song emanating from a floodplain thicket.

When Parker recorded the unseen singer and played back the song, a small brown bird with a bright rufous forehead walked out of the undergrowth and into fame. It was a Rufous-fronted Antthrush, previously known to science from only four specimens collected by Peruvian Indians in the 1950s.

Why is this species restricted to only a tiny area in Peru, and why is it apparently not very common even there? Ornithologists John Terborgh of Duke University and Scott Robinson of the Illinois Natural History Survey have discovered that two closely related birds, the Black-faced and Rufous-crowned Antthrushes, respond aggressively to playbacks of the song of the Rufous-fronted Antthrush. Are they competitively excluding the Rufous-fronted Antthrush from most habitats, forcing it to eke out a fugitive's existence amidst its domineering relatives?

Discovering what makes rare birds rare may seem like an esoteric issue, but it is one of the biggest challenges in conservation biology. Knowing more about patterns of rarity may enable scientists to better determine which species are truly at risk, and how best to protect them.

And the White-winged Potoo? Based on the new information gathered by Cohn-Haft and others, it appears to be in little danger. Or is it? When Cohn-Haft compared the White-winged Potoo he collected in Manaus with the original specimens from coastal Brazil, he discovered that his bird was significantly smaller—so much smaller, in fact, that he believes the Manaus potoo could be an undescribed species.

That leaves us with a new mystery: What has happened to the potoos from the coastal Atlantic forests? They have not been seen for well over a century and a half. Meanwhile, most of these forests have been destroyed, raising the disturbing possibility that the "original" White-winged Potoo is now extinct.

Gain a potoo, lose a potoo. Unfortunately, the "gain" is an abstract result of better knowledge, whereas the loss could be all too real. ■

Further reading

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The Selva Cacique, depicted here by ornithologist and artist John O'Neill, was discovered in 1963 and has never been seen since. Other caciques are not particularly rare—so why is this one?

The Catbird Seat

THE OLD MAN AND THE PLOVER

by Pete Dunne

He was an old man, who birded alone, and he had gone 84 days now without finding a good bird.

"Cheer up," the boy had said. Before the fall term, the boy had been his companion. Now, they spoke only by phone. "Remember, we are in September."

"The month the good birds come," the old man said. "Anyone can be a birder in May—even you."

"Go suck an egg," the boy replied, but with humor. The old man had taught the boy to bird and he loved him (even if the old man *did* still call Northern Harriers "marsh hawks").

"Tomorrow I will be at the dikes at dawn," the old man said. "To be there when the tide is full."

"Bitchin," the boy replied. "Find something to make the members of the records committee commit suttee, old man."

"With luck," the old man replied.

He was there before the security gate opened. But he knew the trick of short-circuiting the electronic timer by placing a metal tool box beside it so that it would open.

"I am an old man," he said. "But I know many tricks."

He was well out on the dikes by the time the sun came up, scanning the pools.

"Just the usual stuff," he assessed. "Peeps, yellowlegs, dows, stilts, and the odd pec." Then a falcon put the flocks up and the old man saw the large, dark-rumped plover for the first time.

"Yes," he said. "Yes." And he trained his scope on the place where the bird landed.

At first he saw nothing but the head—which was strangely shaped for a Golden Plover. Then he saw the back, which was brightly spangled, and the underparts, black only to the legs and bordered by white.

"No," he said. "He can't be *that* good."

But he was that good and the old man found a checklist, which was his only paper, and began sketching.

I wish I had the boy, the old man thought. The boy was an ornithology student who knew tertial talk and even the names of birds in scientific Latin.

Then he said aloud, "I wish I had the boy. To help me and to see this."

The old man had never seen a Greater Golden Plover and could not recall all the field marks. But he illustrated what he saw, his hand cramping with the effort and his excitement, and was nearly finished, when the falcon routed the bird for good.

"Have something?" a voice asked.

The old man turned to see a stranger approaching. Everything about him was friendly, except for the eyes which were aloof.

"A Greater Golden Plover in breeding plumage!" the old man exclaimed. "You just missed it."

The stranger was silent and his face now matched the eyes. "Unlikely," he said. "There's one record for the lower 48."

"Here," the old man offered, "my notes."

The stranger studied the sketch and handed it back.

"Looks like a *fulva*."

"What?"

"A *fulva*. Pacific Golden Plover. Don't you know that Lesser Golden Plover was split?"

The old man shook his head.

"Well it was. You need to do some homework."

The old man was humiliated, but not defeated, and he remembered the boy, and how proud he would be, and so he resumed work on the sketch. It was then that he saw two men approaching, members of the state records committee.

"*Ay*," he said aloud. There is no translation for this word, and perhaps it is just a noise such as a man might make, involuntarily, as his spotting scope goes over a jetty in a wind.

"Who else saw the bird?" the first one asked.

"Did you get photos?" the second one wanted to know.

"Well, write it up anyway," they said before leaving.

I should have brought a camera, he thought, sadly. And I should have had the boy.

His hope was gone, but not his pride. It wasn't until he returned to the refuge headquarters, to log his sighting, and was confronted by the assemblage of birders that this, and all that was left of his happiness, was taken, too.

"Did you notice the length of the legs?"

"Did you check the primary extension?"

"Did you note any signs of molt?"

"Did you see the color of the underwing lining?"

"Have you seen the species before?"

"Are you sure it wasn't just a black-bellied?"

In the end he did not log the sighting, and when the checklist fell to the tarmac as he got in his car he did not care.

Later, a tourist couple visiting Atlantic City took a wrong turn and wandered onto the refuge. The woman, seeing the paper, picked it up.

"What's that?" the man, who was her companion, asked.

"A list of birds found on the refuge," the woman replied. "Someone's scribbled on it."

"I didn't know there were so many birds here."

"I didn't either," the woman replied.

"Maybe we should take up bird watching. I'll bet it's fun."

"Maybe we should. It's got to be more fun than losing money."

At his home, the old man lay face down on the couch. He was sleeping without dreams, and waiting for the boy to return his call. He wanted to say hello and to hear a friend's voice. ■

ILLUSTRATION BY JEFF SIPPLE

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